

ALTA GEOSCIENCES, Inc.

11711 Northcreek Parkway S., Suite 101
Bothell, Washington 98011-8224

Phone (425) 485-1053
Fax (425) 486-7651

SF/DO 21.5
8/01/99

COMPLETION REPORT

Remedial Action Construction

**Standard Steel And Metals Salvage Yard
Superfund Site
Anchorage Alaska**

AUGUST 1999

141 211



ALTA GEOSCIENCES, Inc.

11711 Northcreek Parkway S., Suite 101
Bothell, Washington 98011-8224

Phone (425) 485-1053
Fax (425) 486-7651

COMPLETION REPORT Remedial Action Construction

**Standard Steel And Metals Salvage Yard
Superfund Site
Anchorage Alaska**

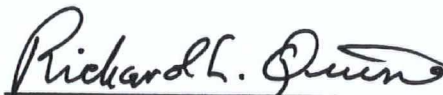
AUGUST 1999

**Remedial Action Construction Completion Report
Standard Steel and Metals Salvage Yard Superfund Site
Anchorage, California**

To the best of my knowledge, after thorough investigation, I certify that the Remedial Action Construction has been completed in accordance with the Remedial Action Work Plan, design and specifications approved by EPA.



Alex Tula
Project Coordinator
ALTA Geosciences, Inc.



Richard L. Quine, P.E.
Project Engineer
ALTA Geosciences, Inc.

To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submittal is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibilities of fine and imprisonment for knowing violations.



David R. Duvall
Authorized Representative
Standard Steel RD/RA PRP Group

TABLE OF CONTENTS

Section	Page
EXECUTIVE SUMMARY	ES-1
1.0 INTRODUCTION	1-1
1.1 Project Description, Location, and Purpose	1-1
1.2 Goals and Objectives Of The Remedial Action	1-2
1.3 Regulatory History	1-2
1.4 Project Background	1-4
1.5 Health & Environmental Safety Issues	1-5
2.0 SOIL REMOVAL ACTION CONSTRUCTION OVERVIEW	2-1
2.1 Implementation Of Remedial Action Design	2-1
2.2 Site Grid System	2-1
2.3 Site Surface Soil Remediation	2-2
2.4 Smear Zone Remediation	2-2
2.5 Consolidation Cell Excavation	2-3
2.6 Consolidation Of Contaminated Debris and Surface Piles	2-3
2.7 UXO Screening and Removal	2-3
2.8 Soil Consolidation	2-4
2.9 Soil Stabilization	2-4
2.10 Consolidation Cell Cover System	2-4
2.11 Erosion Control Wall	2-5
2.12 Site Restoration	2-5
2.13 Storage Vault And Archived Cylinders	2-6
2.14 Monitoring Well Abandonment	2-7
2.15 Remedial Action Cost	2-8
3.0 SOIL REMOVAL AREAS AND DEPTHS	3-1
3.1 Grid Squares Excavated and Consolidated	3-1
3.2 Soil/Debris Piles, Buried Debris, and Oversized Soil	3-2
3.3 Smear Zone Excavations	3-3
3.4 Dust Control	3-4
4.0 SOIL SAMPLING AND ANALYTICAL PROCEDURES	4-1
4.1 Confirmation Sampling Overview	4-1
4.2 Discussion of Data Presentation	4-2
4.3 Soil Sampling Procedures	4-2
4.4 Laboratory Analytical Procedures	4-3
4.5 Data Validation	4-3
4.6 Statistical Evaluation Of Confirmation Data	4-4

TABLE OF CONTENTS (cont.)

Section	Page
5.0 SOIL STABILIZATION/SOLIDIFICATION	5-1
5.1 Treatability Study And Specified Treatment	5-1
5.2 Soil S/S Treatment Operation	5-3
5.3 S/S Soil Quality Assurance Testing	5-4
5.4 Concrete Archive Cylinders	5-5
6.0 UXO SCREENING AND DISPOSAL	6-1
7.0 OFFSITE DISPOSAL	7-1
7.1 Offsite Junk Disposal	7-1
7.2 Drum Removal	7-1
7.3 Buried Tank Disposal	7-1
7.4 Water Treatment and Disposal	7-2
8.0 CONSOLIDATION CELL CONSTRUCTION	8-1
8.1 Elements of the Cell	8-1
8.2 Erosion Control Wall	8-6
9.0 SITE RESTORATION	9-1
9.1 Backfilling Excavations	9-1
9.2 Site Grading and Drainage	9-2
9.3 Ship Creek Riprap removal	9-3
9.4 Ship Creek Bank Restoration	9-4
9.5 Topsoil Placement	9-4
9.6 Landscape Boulders	9-4
9.7 Hydroseeding	9-4
9.8 Planting Trees and Shrubs	9-4
10.0 AIR MONITORING	10-1
10.1 Air Quality Criteria	10-1
10.2 Action Levels	10-2
10.3 Data Ram Dust Monitoring	10-2
10.4 Hi-Vol And PUF Air Sampling and Testing	10-2
10.5 Weather Station Records	10-8
11.0 RECORD KEEPING	11-1
11.1 Daily Logs	11-1
11.2 Health & Safety Reports	11-1
11.3 Final Material Inventory	11-1
11.4 Sample Chain of Custody	11-1

TABLES

**(LOCATED AT END OF SECTION UNLESS
OTHERWISE INDICATED)**

5-1	TREATABILITY STUDY RESULTS	5-2
5-2	S/S SOIL COMPACTION TESTING	5-5
5-3	LIST OF ARCHIVED CYLINDERS	5-6
6-1	IDENTIFIED UXO ITEMS	6-2
7-1	TANK REMOVAL TESTING	7-2
8-1	CONSOLIDATION SOIL COMPACTION TESTING	8-2
8-2	GEOMEMBRANE COVER SOIL COMPACTION TESTING	8-5
10-1	CRITERIA FOR AIRBORNE CONTAMINATION	10-2
10-2	HI-VOL AIR SAMPLING AND TESTING DATA SUMMARY	10-4
10-3	PUF AIR SAMPLING AND TESTING DATA SUMMARY	10-6
A-1	SURFACE REMEDIATION CONFIRMATION SAMPLE RESULTS	A-1
A-2	SMEAR ZONE BOTTOM CONFIRMATION SAMPLE RESULTS	A-7
A-3	SMEAR ZONE SIDEWALL CONFIRMATION SAMPLE RESULTS	A-8
B-1	LEAD RPDS FOR FIELD DUPLICATE SAMPLES	B-3
B-2	PCB RPDS FOR FIELD DUPLICATE SAMPLES	B-5
B-3	MANN-HITNEY TEST ANALYSIS OF PCB RESULTS- SAMPLING ERROR	B-7
B-4	MANN WHITNEY TEST ANALYSIS OF LEAD RESULTS- SAMPLING ERROR	B-7
B-5	MANN-WHITNEY TEST ANALYSIS OF PCB RESULTS- ANALYTICAL ERROR	B-8
B-6	MANN WHITNEY TEST ANALYSIS OF LEAD RESULTS- ANALYTICAL ERROR	B-8

APPENDIXES

Appendix A	Confirmation Sample Results
Appendix B	Data Validation Summary Report
Appendix C	Manifests & Disposal Certificates
Appendix D	Consolidation Cell Record Drawings
Appendix E	Monitoring Well Abandonment Records

DATA VALIDATION REPORTS (for each laboratory package): Submitted under separate cover to EPA, with laboratory data sheets.

TABLE OF CONTENTS (cont.)

Section	Page
12.0 DEVIATIONS FROM ORIGINAL DESIGN	12-1
13.0 CONCLUSION	13-1
14.0 REFERENCES	14-1

FIGURES

1-1 SITE LOCATION	End Of Section 1
--------------------------	-------------------------

The Following Figures Are Located Following Section 14:

2-1	SITE GRID AND PRE-RA TOPOGRAPHY
3-1	EXCAVATION DEPTHS
3-2	SMEAR ZONE OIL AND EXCAVATION LIMITS
4-1	SMEAR ZONE CONFIRMATION BOTTOM SAMPLING
4-2	SMEAR ZONE CONFIRMATION SIDEWALL SAMPLING
8-1	FINAL CONTOURS, CONSOLIDATION CELL
8-2	CONSOLIDATION CELL EDGE CROSS-SECTIONS
8-3	CONSOLIDATION CELL BOTTOM ELEVATIONS
8-4	CONSOLIDATION SOIL TOP ELEVATIONS
8-5	S/S TREATED SOIL TOP ELEVATIONS
8-6	EROSION CONTROL WALL AND FLOOD ELEVATIONS
9-1	SURFACE AND SUBSURFACE DRAINAGE STRUCTURES
9-2	BANK RESTORATION PLAN
9-3	BANK RESTORATION CROSS-SECTION
9-4	TOPSOIL APPLICATION AREAS
9-5	HYDROSEEDDED AREAS

EXECUTIVE SUMMARY

The Standard Steel and Metals Salvage Yard Superfund Site is approximately 6.2 acres in size and is located in the northern part of Anchorage, Alaska. For a number of years, the Site was operated as a scrapyard and materials recycling business. During these operations, lead batteries and power transformers containing PCBs were recycled on the Site, leading to contamination from both lead and PCBs.

Investigations at the Site lead to it being listed on the National Priorities List on January 14, 1989. After expedited removal operations, and completion of a Remedial Investigation, and Feasibility Study in 1996, the EPA Record of Decision (ROD) was issued on July 16, 1996. In 1997, a group of companies named by EPA as Potentially Responsible Parties formed the Standard Steel RD/RA PRP Group, and through a Consent Decree with EPA, dated January 26, 1998, undertook the Remedial Design (RD) effort, which was completed by late January 1998. Under the Consent Decree, the PRP Group agreed to conduct the Record of Decision, and pursuant to the Consent Decree, the PRP Group is considered the "settling Defendants" in the case.

Remedial Action (RA) Construction was undertaken by the PRP Group, starting in April 1998 and was substantially completed by November 1998. Landscaping work and streambank restoration work on Ship Creek was finished in June 1999. ALTA Geosciences, Inc., of Bothell, Washington, acted as the Project Engineer during the Remedial Design and provided construction oversight during the Remedial Action Construction. General Contractor for the Remedial Action Construction was Wilder Construction Company of Anchorage, Alaska. Elements of the construction included:

- Construction of an onsite TSCA compliant landfill (generally referred to as the "consolidation cell" in this report and throughout the design) for isolation of impacted soils, including a geomembrane cover system and up to 3 feet of soil
- Excavation of 32,700 tons of moderately impacted soils and placement without treatment into the consolidation cell (TSCA compliant landfill)
- Excavation, stabilization/solidification treatment and consolidation of 22,272 tons of more heavily impacted soils, including lead stabilization with Maectite of 9,700 tons of soil
- Screening, classification, and disposal of ordnance related scrap and potential UXO materials
- Construction of an erosion control wall to protect the consolidation cell from floodwaters, involving 13,700 tons of riprap and bedding materials

- Site Restoration and landscaping to return the area to productive use and stable environmental conditions

The RA Construction excavations and treatment operations were driven by removal action criteria set forth in the ROD and incorporated into the Remedial Design. In addition to using information generated during the design and prior phases of work, a total of 1496 lead and/or PCB tests were performed during the RA Construction to define appropriate soil removal areas and depths, determine the necessity for treatment, and for confirmation purposes following removal. Statistical analysis of confirmation laboratory data demonstrate that the Site is in compliance with remedial action criteria.

A Final Inspection of the Remedial Action Construction was held with U.S. EPA on June 25, 1999. No significant deficiencies were observed.

1.0

INTRODUCTION

This document was prepared by ALTA Geosciences, Inc. (ALTA) of Bothell, Washington, on behalf of the Standard Steel RD/RA PRP Group, consisting of (listed alphabetically) CBS Corporation (successor by name change to Westinghouse Electric Corporation), Chugach Electric Association, Inc., J.C. Penny Company, Inc., and Sears Roebuck and Co., Inc. Pursuant to the Consent Decree (dated 1/26/98) signed by the members of the PRP Group, they are considered the settling defendants. This report is one of the documents required by Consent Decree as part of the Remedial Design and Remedial Action Construction for the Standard Steel and Metals Salvage Yard Superfund Site (Site). The PRP Group authorized ALTA, the Project Engineer, to perform the Remedial Action (RA) Design and oversight of the RA Construction. This report documents the implementation of the RA Design through the RA Construction, which was substantially completed in 1998 and after final drainage and landscaping work, was 100 percent completed in June 1999.

1.1 Project Description and Location

The Site is approximately 6.2 acres in size, and is located in the northern portion of Anchorage, Alaska, near the intersections of Railroad Avenue and Yakutat Street (See Figure 1-1). It is owned by the Federal Railroad Administration and is in the possession and control of the Alaska Railroad Corporation. Surrounding land use is primarily industrial. A warehouse is located on the north side of the Site, on the east there are warehouses, light industrial facilities, and a produce packing facility. To the west there is a steel fabrication facility. Within the Site, in the north-central portion, a small warehouse/ truck repair shop is located. Ship Creek bounds the south side of the Site. Cottonwood trees and small brush are present along Ship Creek, in the south portion of the Site. For purposes of describing features on the Site, North is designated as being toward Railroad Avenue and Post Road, even though (as shown on the Figures) it is about 35 degrees east of that direction. For example, in this report, we describe Yakutat Street as directly east of the Site and running north and south.

In October 1950, the first documented use of the Site occurred when a construction company leased it for maintenance of heavy equipment and storage of equipment and supplies. This operation continued until 1960. Also during the early 1950's, portions of the Site were mined for gravel, which is believed to have been used in the construction of Elmendorf Air Force Base. By 1972 these excavations had been backfilled, either naturally by the creek, or with artificial fill. A metal recycling and salvage business began operating on the Site in 1955 and continued until approximately 1993. During this period hundreds of thousands of tons of ferrous and non-ferrous metals were handled at the Site. Drums containing chemicals and

wastes were also stored onsite as part of the salvaging operations (EPA, 1996).

1.2 Goals and Objectives Of The Remedial Action

The overall goal of the Remedial Action Design and Construction for the Site was to provide an effective mechanism for protecting human health and the environment from contaminated Site soils, while allowing future industrial /commercial use of the property (EPA, July 1996). A specific goal of the Remedial Action Design was to formalize details of the design and prepare plans and other documents needed to undertake the RA Construction. Following selection of a contractor in January 1998, the RA Design was implemented beginning in April 1998. Soils representing a potential human health risk and potential environmental contaminants were excavated and treated (if required) followed by placement in an onsite consolidation cell (TSCA compliant landfill). These actions eliminated the exposure pathway to these contaminants and achieved the goal of protecting human health and the environment.

1.3 Regulatory History

Prior to April 1986, the EPA Alaska Operations office conducted compliance inspections for transformer handling under the Toxic Substances Control Act (TSCA, 40 CFR Part 761). From 1983 to 1986 the Alaska Department of Environmental Conservation sampled oil from transformers stored on site and in 1985 they collected soil samples in the transformer dismantling area, finding PCB concentrations up to 110,000 ppm. In October 1985, EPA conducted a site assessment which established widespread PCB contamination, up to 165,000 ppm in soils. Further, this assessment documented offsite migration of PCBs in Ship Creek sediments and indications of widespread lead contamination from storage and dismantling of lead-acid batteries (E&E, 1988).

In April 1986, an EPA Order was issued under 42 U.S.C. Section 9607, which lead to a halt in hazardous substance releases, however, site operations continued on the northeast corner of the site until April 1993. The site owners and site operator were requested to perform a removal action, but declined to or were unable to perform the work. This order lead to EPA removal action between 1986 and 1988, fencing the site, and closure of the fenced areas to the public. These removal actions removed and treated principle threats present at the site, including: 1,000 gallons of PCB contaminated oil, eighty-two 55 gallon drums of RCRA hazardous waste, 10,450 gallons of waste oil, 185 PCB contaminated transformers and 781,000 pound of lead acid batteries. The PCB oil was incinerated offsite, the waste oil was recovered, and the batteries were recycled. These activities are documented in the On-Scene Coordinator's Report (E&E, 1988). The site was proposed for listing on the National Priorities List (NPL) on July 14, 1989 and listed on the NPL on August 30, 1990 (55 Fed. Reg. 35502).

On December 6, 1991, the United States filed a lawsuit under Section 107 of CERCLA (42 U.S.C. Section 9607) against eight parties for recovery of EPA's costs in performing the removal action and a determination of future costs. The eight parties sued were the Alaska Railroad Corporation, Ben Lomand Inc., Chugach Electric Association, Inc., Westinghouse Electric Corporation, Sears, Roebuck and Co., Montgomery Ward and Co., J.C. Penny Company, Inc., and Bridgestone/Firestone, Inc. Certain Federal entities were considered potentially liable under CERCLA.

On September 23, 1992, Chugach Electric Association entered into an Administrative Order on Consent to conduct a remedial investigation/feasibility study RI/FS at the site. The RI was completed in August 1994 and the FS was completed in January 1996. A Consent Decree to conduct a Remedial Action (RA) Design and RA Construction was entered into by Chugach Electric Association, Inc., J.C. Penny Company, Inc., Montgomery Ward and Co., Sears Roebuck and Co., Inc., and Westinghouse Electric Corporation (now CBS Corporation). The RA Design was put out to bid in December 1997 and all elements were completed in January 1998. The RA Construction was started in April 1998 and substantially completed in November 1998, with final drainage and landscaping tasks being finished in June 1999.

In 1994 EPA published the Baseline Human Health Risk Assessment (EPA 1994a), which evaluated the risks presented to the environment and to human health by Site contamination. That document established that identified levels of PCBs present on the Site and accessible to Site workers created an unacceptable human health risk. This finding was a motivating factor in the requirement for RD/RA activities to remediate the Site.

EPA selected a remedial action for the Site, and documented their selection in the Record Of Decision (ROD), Standard Steel And Metals Salvage Yard Superfund Site, Anchorage, Alaska (EPA, July 1996). The specific requirements of the selected remedy (quoted directly from the ROD) are:

- Removal of regulated material stockpiled on-site and of investigation derived wastes with disposal in a RCRA Subtitle C or D landfill or recycling of the materials;
- Off-site disposal of remaining scrap debris by recycling or disposal in a RCRA Subtitle D landfill or, if the debris is a characteristic hazardous waste or contains greater than 50 mg/kg PCBs or 10 mg/100 cm² PCBs by standard wipe tests, treatment and disposal in a RCRA Subtitle C or TSCA landfill;
- Excavation and consolidation of all soils exceeding a 10 mg/kg PCBs or exceeding 1000 mg/kg lead cleanup level;
- Treatment of all soils at or greater than 1000 mg/kg lead or 50 mg/kg PCBs, or greater by stabilization/solidification;
- On-site disposal of stabilized/solidified soils and excavated soils between 10

- mg/kg and 50 mg/kg PCBs in a TSCA landfill;
- Excavation of soils impacted above 1.0 mg/kg PCBs and 500 mg/kg lead from the floodplain and consolidation of these soils elsewhere on the site;
- Maintenance and repair of erosion control structure on bank of Ship Creek;
- Maintenance of solidified/stabilized soils and the landfill;
- Institutional controls to limit land uses of the site and, if appropriate, access; and,
- Monitoring of groundwater at the site to ensure the effectiveness of the remedial action.

During the design of the remedy, certain enhancements were added which were not included in the description of the remedy included in the Record of Decision. These enhancements were designed to improve the freeze thaw resistance of the solidified soil, provide additional flood protection to the consolidated soil, and reduce or eliminate the areas for which land use controls and Site access restrictions were needed. These include:

1. Addition of a geomembrane cover system covering the solidified soils.
2. Construction of a completely new erosion control structure located inland from the existing stream bank.
3. Excavation and consolidation of all upland surface soils outside the limits of the landfill which exceed 1.0 mg/Kg PCBs or 500 mg/Kg lead.
4. Placing three feet of clean cover over the geomembrane cover system and all contaminated soils within the landfill.

Although the Record of Decision, Remedial Investigation and Feasibility Study for the Site made use of floodplain mapping appropriate to conditions present at the time they were written, under the post-construction conditions, these maps were no longer applicable. Therefore, in order to follow the intent of the Record of Decision, a choice was made to define the Ship Creek Floodplain as that area southward of the completed erosion control wall.

Because of the above enhancements to the Remedial Design, and the concurrence of the property owner (Alaska Railroad Corporation) regarding institutional controls, as set forth in the Consent Decree, EPA determined that the design exceeded the requirements of the ROD. This allowed EPA to waive requirements for fencing around the TSCA landfill (consolidation cell), as set forth the Explanation Of Significant Differences (EPA, November 18, 1998).

1.4 Project Background

Starting in 1950 and continuing on parts of the Site until 1960, the Site was leased by a construction company for storage of heavy equipment and supplies. During the period 1950 to 1953, based on aerial photography, the southern half of the Site was mined for gravel. By 1972, the excavated area had been backfilled with soil to

approximately the present grade.

In 1955 a metals recycling and salvage business started operating at the Site and operated under various business names until 1993. Records indicate that many hundred thousand tons of ferrous and nonferrous metals were handled at the Site. Salvage operations also included recovery of copper from transformers and lead from batteries. Batteries were recycled to recover the lead plates they contained. Fluid and sludge in the batteries were improperly disposed of during the process of storage or breaking open battery cases, leading to environmental contamination by lead. In other cases, the batteries were stored onsite and later sold without processing.

Some transformers were drained of fluids prior to arriving at the Site. Those arriving full were drained and the fluid either recycled or released onto the ground. This oil contained polychlorinated biphenyl compounds (PCBs). There are no records that any of it was shipped off-site for proper disposal (EPA, 1996). Insulation was burned from the transformer cores in an onsite industrial burner, and they were then shipped offsite for salvage of the copper.

Following EPA Emergency Response Actions on the Site in 1986, the salvage business was confined to a small area in the northeast corner, along the south side of Railroad Avenue and west of Yakutat Street. Releases of hazardous substances as a result of recycling or salvage activities are not known to have occurred after that time (WCC, January 1996; EPA, July 1996).

1.5 Health & Environmental Safety Issues

The nature and extent of contamination has been presented in the RI (WCC, 1994a) and in the FS (WCC, 1996). The information in this section is summarized from the FS Report. These reports together with the Baseline Human Health Risk Assessment (PRC, 1994) show that, consistent with past Site operations, the primary chemicals of concern (COCs) are lead and polychlorinated biphenyls (PCBs). For clarity and organization, lead and PCBs are listed in alphabetical order in this document. No implication as to the relative hazards posed by lead and PCBs is intended from the use of alphabetical order.

For almost all samples where PCBs were detected during the RI, Aroclor 1260 was the only PCB congener which was found, so that the total PCB concentration is represented by Aroclor 1260 concentration in all results discussed in this section.

Baseline Human Health (HRA) and Ecological Risk Assessments (ERA) were prepared for the Site by EPA (PRC, 1994(a) and 1994 (b)). Exposure to lead was not evaluated quantitatively in the HRA because EPA considers it inappropriate to develop a toxicity value for lead due to the low threshold for noncarcinogenic effects. Of the chemicals evaluated, PCBs and dioxins and furans, through soil ingestion and

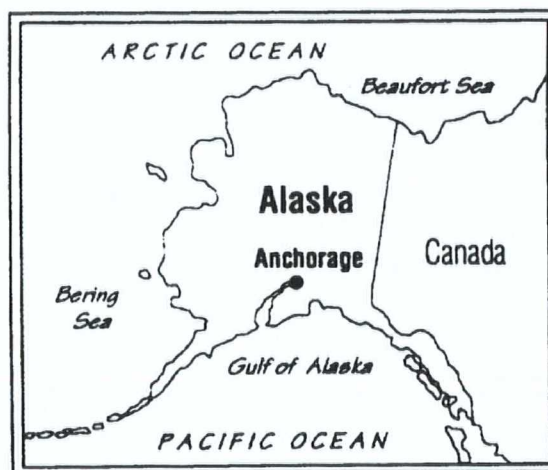
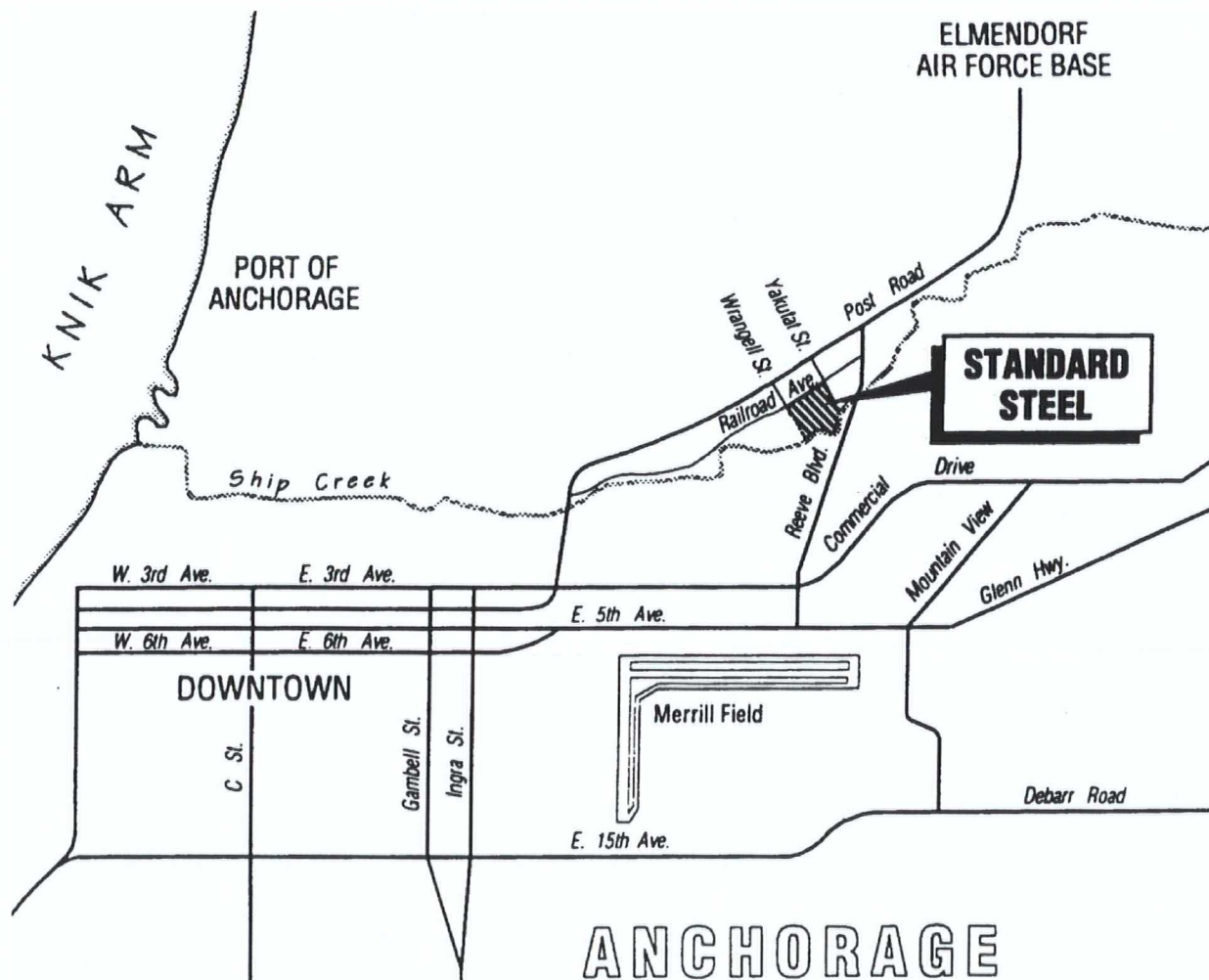
dermal contact, contributed most significantly to Site risk. The ERA concluded that the most sensitive habitat in the Site vicinity is Ship Creek, but that the data indicate that Ship Creek is not presently being impacted by contaminants from the Site.

1.6 DESCRIPTION OF COMPLETION REPORT

This report is organized into the following sections:

	Certification Page
	Contents
	Executive Summary
1.0	Introduction
2.0	Soil Removal Action Construction Overview
3.0	Soil Removal Areas And Depths
4.0	Soil Sampling And Analytical Procedures
5.0	Soil Stabilization/Solidification
6.0	Uxo Screening And Disposal
7.0	Offsite Disposal
8.0	Consolidation Cell Construction -- Soil
9.0	Consolidation Cell Geomembrane System
9.0	Site Restoration
10.0	Air Monitoring
11.0	Record Keeping
12.0	Deviations From Original Design
13.0	Conclusion
14.0	References

Appendix A contains confirmation sample results, Appendix B contains a Data Validation Summary Report, Appendix C contains manifests and disposal certificates for offsite disposal, and Appendix D contains Consolidation Cell Record Drawings sealed by a licensed land surveyor.



Standard Steel & Metals Salvage Yard Superfund Site
RA CONSTRUCTION COMPLETION REPORT

SITE LOCATION MAP

FIGURE 1-1

August, 1999

ALTA Geosciences, Inc.

2.0

SOIL REMOVAL ACTION CONSTRUCTION OVERVIEW

2.1 Implementation Of Remedial Action Design

The specific goal of the Remedial Action Design was to formalize details of the design and prepare plans and other documents needed to undertake the RA Construction. The Work Plan for Remedial Design/Remedial Action (ALTA, May 1997) set forth a comprehensive description of the work involved in the Design, schedules, and outlines of deliverable documents. After that document was approved by EPA, work proceeded on the Design and was completed in January 1998. Milestones of the Design included the following:

- Conceptual Design Plan – Introduced remedial design features for discussion by interested parties and provided discussion of potential future development and reuse of the Site.
- Preliminary Design Report – Presented more detailed discussion of design features and methods of implementing the construction; presented supplemental site investigation report, flood evaluation, and supplemental Treatability Study; presented draft technical specifications and drawings for the RA Construction.
- RA Construction Implementation Plans – Presented Health and Safety, Sampling and Analysis, Quality Assurance, Operations, Monitoring, and Maintenance, and contractor procurement procedures.
- Pre-Final Design – 95% completion level design documents, including contractual terms, technical specifications, and drawings.
- Final Design – 100% completion level design documents.

The design work was completed in January 1998 and the project proceeded to construction in March 1998.

2.2 Site Grid System

The location of sampling points and all soils removal on the Site has been based on a grid system initiated during the EPA Removal Actions and continued through the RI/FS and RA Construction. It was necessary to use the same grid square framework, so that the locations of samples from different sources could be integrated and the required removal areas defined. Figure 2-1 shows the grid system, which provides letter designations for the columns and number designations for the rows in the grid. Each grid square in this system is 80 feet by 80 feet. For purposes of defining soil excavation areas during construction, this was considered too large, and consequently, each grid square was divided into four quadrants

(Quads), designated NW, NE, SE, and SW (based on compass locations).

In order to simplify the task of keeping track of the quantities of material removed from various Quads, a unit of measure called the "Quad Layer" was used. This quantity was the amount of soil in a 40' by 40' Quad, 6-inches deep, equal to approximately 29.6 cubic yards. Direction to the RA Contractor was in terms of removing a specified number of Quad Layers for a designated Quad. The Quad Layer was also the unit pay quantity for soils removal.

2.3 Site Remediation Work

2.3.1 Access Controls

Prior to starting work on remediation of the Site, the RA Contractor installed temporary fencing around the remediation area to restrict access to the Site. In addition, a security service was hired to patrol public Site Access points at night and on weekends. Because of the variety of work activities taking place on the Site at any one time, a single defined exclusion zone and single set of personal protection requirements for the Site was difficult. Generally, the entire fenced Site was considered an exclusion zone, with varying worker protection requirements, depending on specific work activities.

A decontamination station for workers and equipment was established at the Site entry gate. This was essentially the only access to or from the Site. The vehicle/heavy equipment traffic leaving the Site had to pass over a paved wash pad where vehicles were cleaned using a high pressure washer before leaving. Site workers had boot washes and disposable clothing drop points outside a trailer at the egress point. Inside the trailer there were clothing lockers and washing facilities for the workers.

2.3.2 Soil Remediation

Site surface remediation was completed in approximately 170 quadrants during the RA Construction. Materials remediated included insitu soils from 6-inches thick to several feet thick, and surface piles of mixed soil and debris. Based on pre-construction sampling, decisions were made regarding the initial depth of removal and whether to treat or simply consolidate the soil. Prior to completion of initial sections of the consolidation cell and start-up of the S/S treatment plant, all excavated soils were stockpiled in the central portion of the Site. Afterward, these materials were relocated to the S/S stockpile if S/S material or to the consolidation cell as appropriate. Once the consolidation cell was opened, all consolidation soil excavated went directly into the cell for placement. Following the first estimated soils removal in a quadrant, a confirmation sample was collected and analyzed to determine if removal criteria were met. If the sample exceeded allowable values, additional soil was removed and another sample was taken. This process was continued until the criteria were met.

2.4 Smear Zone Remediation

Over a period of several years scrapyard operations involved recycling electrical transformers, mainly for the copper wire on the coils. When dismantling the transformers, the cooling fluid (oil which contained PCBs) was apparently dumped on the ground. Leaks from a hydraulic crusher may have also contributed to the oil spillage. The general area of this discharge was in Grid Squares A4, A5, B4, and B5. The oil moved vertically downward about 8 feet to the groundwater table. Groundwater flows from northeast to southwest under the Site. After reaching groundwater, the oil floated downgradient on the water approximately 330 feet. Of course, it took several years to travel that far, during which the seasonal groundwater fluctuations moved through a 2-3 foot range and the oil was smeared out over a zone of that thickness along the length of it's path. Hence the name "smear zone".

Remediation of the smear zone was considered a major objective of the RA Construction. This work involved excavation of both impacted and non-impacted soil down to about 1 foot above the groundwater table, installation of sheet piling, dewatering, and excavation of the smear zone. The approach that was taken is discussed in more detail in Section 3.0.

2.5 Consolidation Cell Excavation

During the soils remediation phase, contaminated materials were excavated until the removal criteria were met. Then, additional non-impacted soil was removed as necessary to reach the design grade for the cell. The cell bottom was designed to be as deep as possible and still stay at least 1 foot above the high groundwater level determined from the RI data. In portions of the cell underlain by the smear zone, remediation of the smear zone was completed first, and then that excavation was backfilled to the design bottom of the consolidation cell.

2.6 Consolidation Of Contaminated Debris and Surface Piles

At the beginning of the RA Construction, there were numerous piles of debris on the surface of the Site. Further, in portions of the Site, buried debris mixed with soil extended several feet into the subsurface. All debris was handled the same as the soil of the Quad in which it resided at the beginning of the RA Construction. Debris in consolidation soil removal Quads was stockpiled along with that soil for later placement in the consolidation cell, or moved directly to the cell, along with the soil. No screening was required. The exception to this was for debris located in Quads being screened for UXO items (see below). In that case, consolidation soil was screened to separate UXO debris items.

Debris in Quads determined to need soils removal for S/S treatment was screened to 2-inch minus, and the soil plus debris passing the screen was sent through the

treatment process. Oversized debris (plus 2") went to a temporary stockpile and during the placement of S/S treated soil, was moved from the stockpile to make thin interlayers within the S/S mass.

2.7 UXO Screening and Removal

The term UXO refers to actual or potentially explosive military ordnance items that cannot be verified as having been expended. Because of prior scrap removal activities at the Site, it was known that steel artillery shell casings were present. However, previous operations had not encountered any problems with handling or disposing of these items, and no special handling was expected to be necessary. After review of the Work Plan and design by the Corps of Engineers, it was determined that shell casings would have to be treated as potentially live, until examined by a UXO specialist and cleared. A survey of the Site was undertaken to identify the locations and nature of UXO items. That survey identified additional types of UXO items and initiated a more involved screening process for these items. Section 6.0 presents a more detailed discussion of the items found and their disposal. Once UXO specialists had determined that potential UXO items were not, in fact, potentially explosive, they were designated as Ordnance Related Scrap and disposed of as site debris (Section 2.6).

2.8 Soil Consolidation

Approximately 32,000 tons of soil was excavated and consolidated without treatment. Excavation of the consolidation cell was discussed above. Soil material placed in the cell was spread using a small dozer to a loose thickness of less than 12 inches, then compacted using a vibratory steel drum roller. A significant amount of metallic and other non-compressible debris was filled in the cell between layers of soil. Some wooden debris was filled in the cell, but this was widely dispersed and well-mixed with soil so as to minimize future settlement if the wood decays.

2.9 Soil Stabilization

Approximately 22,300 tons of soil determined to have 50 mg/kg PCBs or greater and/or 1,000 mg/kg lead or greater was treated prior to placement in the consolidation cell.

2.9.1 Treatment Of Lead Impacted Soils

Within each individual grid square where the soil resided, soils exceeding the lead criteria were treated with MAECTITE, a proprietary acid which reduced the mobility of the lead and its potential for leaching. The designated removal thickness of soil requiring lead treatment was first loosened and mounded in the center of the quadrant. The treatment was done by spray application of a pre-established amount of acid to the soils in the mound and thorough mixing by the excavator. After mixing, lead-treated soils were removed to the S/S stockpile and handled the same as soils

being treated for PCBs in the pugmill operation.

Soils being removed for PCBs, lead, or for both were screened to remove 2-inch plus cobbles and debris, then processed through a pug mill. In the mill the soil was treated by mixing with Portland cement, fly ash, and water. After this treatment, S/S soil was placed on top of consolidation soil in the cell and compacted to achieve a dense mass. Section 5.0 presents a more detailed account of the S/S process.

2.10 Consolidation Cell Cover System

The top surface of the S/S soil was bladed and compacted with a roller, so that it was relatively smooth and even. Surrounding the cell, at locations specified on the project drawings, an anchor trench was constructed as the outside terminus for the cell cover system. This system consisted of the following components (top down):

- Three feet of compacted sandy gravel cover soil. The lower 18 inches was placed without compaction until the fill thickness was installed, then this layer was compacted to 90 percent relative compaction (ASTM D 1557). The remaining 18 inches were placed in two lifts with compaction to 95 percent relative compaction.
- A two-sided geocomposite layer was placed between the cover soil and underlying layers. This material has a layer of HDPE geonet which is designed to transmit water parallel to the flat dimensions of the layer. The geonet is heat bonded to and sandwiched between two layers of 8-oz/sq. yd non-woven geotextile.
- The geocomposite layer was underlain by a layer of 40-mil Seamans XR-5 geomembrane. This material is reinforced with high-strength fibers and has considerable chemical resistance. It was fabricated in a local factory and shipped to the Site in large panels. These panels were laid out and seamed together in the field.
- Underlying the geomembrane was a layer of closed cell foam insulation. The purpose of this material was to insulate the S/S soil mass and reduce the number of freeze-thaw cycles to which it would be subjected over its life-span. This material was laid directly on the compacted S/S soil cement.

2.11 Erosion Control Wall

A flood study was done for the project during the Preliminary Design phase, and published as an attachment to the Preliminary Design Report (ALTA, 1997). This study concluded that, at a minimum, the consolidation cell should be located such that there would be a channel capacity sufficient to pass a flood of 2,800 cfs at a stage of Elevation 78 feet, and that the landfill should be protected with a permanent

riprap structure up to at least Elevation 80 feet. Therefore, in order to avoid constructing a floodway constriction, and to minimize long-term impacts to the greenbelt along the creek, the consolidation cell was sited as far northward as possible, given the obvious requirement that sufficient capacity be available to consolidate the required amount of soil. To allow for some freeboard during flooding, the riprap structure was built up to Elevation 83 feet. It was constructed across the entire southern side of the cell, and wrapped up both sides (east and west) about 90 feet .

The wall was founded below the scour depth for the creek and consisted of a geotextile separation fabric at the base, gravel bedding consisting of 2" to 6" quarry rock, a toe section containing Class 4 (ADOT specification) 2000 pound rock which was at least 5 feet thick and 10 feet wide. The main armor rock was founded on the toe rock, and consisted of Class 3, 700 pound stone that was 4 feet thick all the way up the slope. All total, almost 14,000 tons of bedding, Class 3 and Class 4 rock was used for the structure. The stone was hard, durable granitic rock which should retain its ability to function as designed in the long term.

2.12 Site Restoration

Site restoration included the following elements:

- Backfill soils removal excavations outside the consolidation cell with imported gravelly sand soil; several thousand tons of material was imported for this purpose, most of which was installed on the east, southeast, and south sides of the consolidation cell
- Install asphalt concrete in areas where pavement was removed during the RA Construction; approximately 26,200 square feet of 6-inch crushed rock and 2-inch thick pavement was installed along the north and east sides of the cell
- Install imported topsoil on consolidation cell sideslopes, to facilitate growth of vegetation; approximately 600 tons of material was installed in depths ranging from 4 to 6 inches.
- Grade all areas to drain to constructed drainage ditches or toward natural drainage swales
- Remove existing riprap from Ship Creek in the southern part of the Site
- Construct streambank restoration structures
- Plant trees and shrubs in the floodplain area below the consolidation cell and along the top-of bank zone adjacent to Ship Creek

- Install twenty five 7-ton boulders in the floodplain area so that in the event this area becomes a creek overflow channel, current velocities will be reduced by turbulent flow in the vicinity of the erosion control wall
- Hydroseed and mulch approximately 3 acres of disturbed ground and the cell sideslopes
- Install jute matting on the consolidation cell sideslopes, to reduce erosion potential until vegetation is established

The original, EPA approved, design for streambank restoration was relatively minimal. The approved design did not address habitat concerns raised by the Alaska Department of Fish and Game. At the request of the Alaska Department of Fish and Game in January, 1999, the streambank restoration efforts were substantially expanded to include an extensive biotechnical habitat restoration. This work was completed in June 1999.

2.13 Storage Vault And Archived Cylinders

To contain samples of treated soils from the Site, a storage vault was constructed near the northwest corner of the consolidation cell. The vault consisted of a manhole top section approximately 5-feet in diameter and 5-feet deep, constructed of 4-inch thick concrete. It was open at the bottom and covered with a 4-inch thick concrete lid having a standard heavy steel lid in the center for access. Foam insulation was placed around and on top of the samples within the vault. Samples of freshly-mixed S/S treated soil were collected periodically throughout the treatment program. Cylinders of this soil were made by compacting soil in plastic molds and allowing it to cure. Sample cylinders were subsequently labeled and placed in the storage vault for future testing. Details regarding the cylinder and vault are presented in Section 5.0.

2.14 Monitoring Well Abandonment

Because of locations that interfered with required construction, a number of monitoring wells and probes were abandoned, including the following: 1, 2, 3, 7, 11, 16, 17, 17a, 18, 18a, 19, 19a, 21, and 21a. The work was done by Alpine Drilling & Enterprises, an AK registered specialty contractor. Well materials were removed and each well was pressure grouted from the bottom up using American Colloid High solids Bentonite grout. A number of other wells, including 4, 12/12a, 20, 23, and 25-29 were excavated and decommissioned during the excavation for the consolidation cell. Wells 13, 14, 15, 22, and 24 were retained for future groundwater monitoring at the Site. Monitoring well abandonment records are contained in Appendix E.

2.15 REMEDIAL ACTION COST

The construction cost for this Remedial Action was approximately \$5.3 million, as summarized on Table 2-1. These are construction and disposal costs and do not include engineering, laboratory analysis, nor administration.

**TABLE 2-1
REMEDIAL ACTION COST**

WORK ITEM	APPROXIMATE COST (rounded to nearest \$1,000)
Mobilization	\$845,000
General Site Work (drainage, soil backfill, grading, etc.)	\$360,000
UXO-Related Work	\$227,000
Cell Excavation	\$128,000
Consolidation Soil Excavation And Placement	\$247,000
Maectite Stabilization For Lead	\$200,000
Stabilization/Solidification Treatment And Placement	\$1,440,000
Sheet Piling For Smear Zone	\$189,000
Smear Zone Dewatering And Disposal	\$86,000
Cell Cover System	\$834,000
Erosion Protection Wall	\$524,000
Landscaping (topsoil, riprap removal, plantings)	\$140,000
Offsite Disposal Costs (PCB oil, rails, tank)	\$34,000
REMEDIAL ACTION COST TOTAL:	\$5,254,000

Operations and maintenance activities are limited to semiannual groundwater monitoring and periodic inspections. Not including possible repairs (which cannot be estimated with any certainty), annual O&M costs should not exceed \$30,000. This cost may be reduced if EPA allows a reduction in the groundwater monitoring frequency after the two years specified in the Record of Decision and Statement of Work.

3.0

SOIL REMOVAL AREAS AND DEPTHS

The Record Of Decision, Standard Steel And Metals Salvage Yard Superfund Site, Anchorage, Alaska (EPA, July 1996) established the selected remedy for the RA Construction. With respect to soils removal, the following was required:

- Excavation and consolidation of all soils exceeding a 10 mg/kg PCBs or exceeding 1000 mg/kg lead cleanup level;
- Stabilization/solidification (S/S) treatment of all soils having contamination levels equal to or greater than 1000 mg/kg lead, or equal to or greater than 50 mg/kg PCBs;
- On-site disposal of S/S-treated soils and of excavated soils contaminated with between 10 mg/kg and 50 mg/kg PCBs in a consolidation cell;
- Excavation of soils contaminated above 1.0 mg/kg PCBs and 500 mg/kg lead from the Ship Creek floodplain and consolidation of these soils on the portions of the Site where use and access restrictions will be implemented;

In addition, the decision was made during the design phase to remove soils outside the boundary of the landfill containing 1.0 to 10 mg/kg PCBs and between 250 and 500 mg/kg lead in locations less than 3 feet from the finished surface. This was done in order to mitigate restrictions requiring fencing and/or institutional controls of the remediated Site, if such soils remained in the top 3 feet of Site soils.

Decisions regarding where to excavate and the required depths were made based on the above criteria in light of available pre-RA Construction investigation data, data from test pits completed during the RA Construction, and confirmation sampling following excavation in any given area. Confirmation sampling results are discussed in Section 4.0 and tables of the confirmation sampling data are presented in Appendix A. For purposes of clarity, confirmation samples are segregated into those taken for near-surface remediation, smear zone bottom, and smear zone sidewall locations. It should be noted that within the soil overlying the smear zone, there were quads containing S/S soil, consolidation soil, and non-impacted soil (in some locations, all three types in the same quad). Remediation/removal of these had to be addressed before excavation of the smear zone soils.

Regarding which quads were remediated and which did not require remediation, refer to Table A-1 for the surface confirmation sample results. Individual quadrants that received remediation may be identified by looking at Column 2, "Date Excavated". If a date appears in that column, remediation was completed. If "CS" appears in the column, the quadrant was sampled and did not require remediation.

3.1 Grid Squares Excavated and Consolidated

Soils excavations were completed in 170 quadrants (40' x 40'), approximately 6.25 acres of area. Figure 3-1 shows the approximate limits of the area excavated and the depth of excavation relative to pre-RA ground levels. This includes both consolidation soil removal and S/S soil removal. Most excavated quads contained both types of soil in different layers.

A total of 681 Quad Layers of consolidation soil (32,700 tons) was excavated and placed in the consolidation cell. A total of 464 Quad Layers of S/S soil (22,272 tons prior to treatment) was excavated and placed in the consolidation cell on top of the untreated soil. Included within the 464 Quad Layers of excavated soil was 202 Quad Layers (9,700 tons) of soil that was treated for lead stabilization with Maectite before being processed in the pugmill with cement and flyash. Approximately 160 Quad Layers of soil (7,700 tons) that received S/S treatment came from the Smear Zone excavation. Additional information on the S/S process and the soils that were treated is presented in Section 5.0.

3.2 Soil/Debris Piles, Buried Debris, and Oversized Soil

Debris items encountered during the RA Construction included scrap metal, bricks, glass, wood, and plastic. Military ordinance items (UXO) were part of the metal debris. These items appeared to have been imported to the Site over a considerable length of time during which the scrap yard was operating. They were found on the surface as well as buried, up to about 4 feet deep. Surface piles of mixed soil and debris were located throughout the Site. Most of these had been pushed up by contractors during Pre-RA Construction activities to remove surface scrap and hazardous materials. The total amount of material handled during the RA Construction is estimated to have been about 1,500 to 2,000 cubic yards.

The largest soil pile was located in the east-center of the Site and contained approximately 700 cubic yards of lead-and PCB-impacted material that had been widely scattered on the surface. It was consolidated in one pile and covered with about 2-inches of shotcrete to reduce environmental and human health risks associated with the material. Sampling in the pile determined that it had PCB contamination ranging from 83 mg/kg to 940 mg/kg and lead contamination ranging from 138 mg/kg to 3,180 mg/Kg (3 of 4 values over 1,500 mg/kg).

With the exception of the large shotcrete-covered pile mentioned above (which was separately sampled), soil-debris piles were not sampled, and they were treated the same as the top layer of underlying soil in the quadrant. That is, if the surface layer in the quadrant was excavated for S/S treatment, the pile was considered S/S material, otherwise, it was considered consolidation soil. As discussed below in the section *UXO Screening and Disposal*, most of the smaller soil-debris piles were screened initially for UXO items. This was because they were located in quadrants in which significant numbers of UXO items were identified on the surface or in the

underlying soil.

There was no requirement to screen consolidation soil materials, and with the exception of UXO screening, debris and over-sized consolidation soil went directly to the consolidation cell (or short term storage, then the cell). S/S soil, however, was all screened to 2-inch minus before being processed in the treatment plant. This was necessary, since rocks or debris larger than 2-inch size have the potential to damage the mixing paddles in the pugmill. All S/S material larger than 2-inch was placed within the treated S/S mass as interlayers a few inches thick. The majority of this material was cobbles and large gravel.

3.3 Smear Zone Excavations

Site investigation work to define the extent of the smear zone started during the Remedial Investigation in 1993 (WWC, 1994) when several soil borings were drilled and monitoring wells installed. The work continued in June 1997 with additional borings for the Supplementary Site Investigation (SSI) (ALTA, 1997), and was further refined during January 1998 with a second phase of the SSI (ALTA, 1998). At that time the general location and depth of the smear zone was known, but the exact limits (to within a few feet) of the smear zone and its thickness still had to be determined. Defining the smear zone limits to this level of precision was considered necessary for three reasons. First, over-excavation would be expensive, since this soil was all being treated. Second, the sheet piling wall which surrounded deeper portions of the smear zone would be expensive to move outward, if the area defined as the smear zone were found to be larger than the sheet pile corral. Third, side-wall sampling in the smear zone excavation was required by EPA, however this was not directly possible, because of the sheet piling.

Therefore, the alternative allowed by EPA was to sample from test pits prior to installation of the sheet piling. This made a large number of test pits necessary on both sides of the smear zone boundary. Using information from the test pits, the limits of smear zone were interpreted within a few feet, all the way around the smear zone. The line representing these limits is shown on Figure 3-2. Also indicated by the hatch pattern on Figure 3-2 is the depth of excavation in the smear zone. This information was determined from test pit samples taken at various depths within the smear zone. The eastern portion of the smear zone excavation (east end to the C/D line), closest to the source area, was the most heavily impacted and contamination extended through a thickness of about 5 feet. A middle portion of the smear zone, from the C/D line to about 10 feet east of the D/E line was excavated 2-1/2 feet thick, and the remainder was excavated 2 feet thick.

In order to minimize the spread of contamination, expedite the excavation process, and allow efficient confirmation sampling, it was necessary to dewater the smear zone excavation. Groundwater was near the top of the smear zone. Based on the soil type and required depth of excavation below the water level, it was necessary to use a sheet piling cofferdam around the middle and eastern portions of the smear

zone. The area was excavated to within 6-inches to 12-inches above the water level, then the sheet piling was driven along the lines shown on Figure 3-2. Confirmation samples outside this line had determined that an excavation out to the sheet piling would encompass actionable soil. After the sheet pile cofferdam was installed, a 6"-12" layer in the smear zone was removed, to expose the water table. This was done so that floating oil could be skimmed off and not have to be processed through the water treatment plant or further affect soils in or below the smear zone

After floating oil was removed, groundwater was pumped from the inside the cofferdam to lower the water level below the excavation depth. This water was pumped through HDPE piping to a treatment plant located in the northwest corner of the Site. Next, smear zone soil was excavated down to the specified depths. Based on previous testing, all smear zone soil was considered to have PCBs greater than 50 mg/kg and went directly to the S/S treatment stockpile. After soils removal, the bottom of the excavation was sampled to confirm remaining soil was below the action level. A similar sequence of events was performed for the western portion of the smear zone. Because the impacted zone was found to be thinner at that end, the contractor was able to dewater to the required excavation depth by pumping from sumps and sheet piling was not needed. After all excavation and confirmation sampling was completed, the hole was backfilled with compacted imported coarse granular backfill, up to the level of the bottom of the consolidation cell.

3.4 Dust Control

Mist from fire hoses was used to control dust when excavating or screening surface soils that were dry enough to generate dust. Because of frequent rain during the soils removal work, the soils being handled were often moist to wet, and no dust suppression was necessary. Haul roads within the Site frequently dried out because of truck traffic and had to be watered. The contractor kept a water truck working within the Site and on the surrounding roadways whenever necessary.

4.0

SOIL SAMPLING AND ANALYTICAL PROCEDURES

4.1 Confirmation Sampling Overview

In total, 856 samples were taken during the RA Construction, for purposes of defining appropriate soils removal areas and for confirmation purposes after removal. From those 856 samples, 1494 tests for lead and PCBs were performed. A master table presenting all these results has been included in the supplemental report which includes actual laboratory data sheets and data validation reports for each laboratory data package. This report has been supplied to EPA under separate cover. It should be emphasized this table lists, and the laboratory data packages include, many samples taken prior to remediation work and therefore the results exceed allowable criteria for soils left in place on the Site. These areas were all subsequently remediated, as required by the Record of Decision (EPA, 1998) and the RA Construction Work Plan (ALTA, 1997). Since pre-remediation samples relate to materials no longer present (except as placed in the consolidation cell), these results are not discussed further in this report.

Following remediation in each quadrant, confirmation sampling was done. This sampling has been divided into sampling done for surface remediation and sampling done for remediation of the smear zone. All sampling was done in accordance with the procedures presented in the Field Sampling and Analysis Plan, Appendix A to the Remedial Action Construction Work Plan (ALTA, 1998), or alternative methods approved by EPA for this project.

4.1.1 Surface Confirmation Sampling

A total of 223 quadrants were either sampled and did not require remediation or were remediated and then sampled. Table A-1 presents a listing of all quadrants sampled and both the lead and PCB confirmation testing results. Since this list encompasses a major part of the Site grid system, please refer to Figure 2-1, Site Grid System for the quadrant locations. The sample results shown in Table A-1 represent the final sample taken for each Quadrant, to demonstrate compliance with remedial action criteria. In many cases, numerous prior samples were taken during site investigation activities and/or during soils remediation in a given Quadrant. No attempt has been made to compile in this report early investigation and early RA samples for each Quadrangle. The criteria used to evaluate Quadrants for completion varied, depending on the Quadrant location in relation Site features such as the consolidation cell or the flood plain. Samples designated in Table A-1 as "CS" are surface confirmation samples. Samples designated "TP" were collected in a backhoe testpit. A complete listing of all laboratory analyses performed as a part of the RA construction is contained in the report *Laboratory Analysis Reports – Remedial Action Construction* (ALTA, July, 1999).

4.1.2 Smear Zone Confirmation Sampling

Figures 4-1 and 4-2 show the designations and locations for bottom and sidewall confirmation sampling areas associated with the smear zone. Samples shown on the figures and listed in the Tables A-2 and A-3 are final confirmation samples and not the total number of test pit samples used to determine the smear zone location and depth. Bottom samples were collected at random locations within their respective sampling areas. As for other (surface soils removal) confirmation sampling, these samples were collected at 0-6" below the bottom of the excavation. Sidewall samples were collected at approximately the horizontal locations indicated in the figure by the sample name. These samples were collected at vertical locations corresponding to 12"-18" above the bottom of the excavation, or at the level of heaviest contamination inside the adjacent smear zone.

Because of the irregular shape of the smear zone, not all sampling areas were 40' x 40' quadrangles. Sampling areas in the interior portion of the excavation followed the standard quadrangle designations used throughout the Site. Sampling areas near the perimeter were equivalent in area to 40' x 40' quads, but had irregular shapes. Table A-3 lists the smear zone bottom confirmation sample results for the areas shown on Figure 4-1. Table A-3 lists the smear zone sidewall confirmation sample results for the areas shown on Figure 4-2.

4.2 Discussion of Data Presentation

Data presented in the above tables, A-1, A-2, and A-3, relates only to confirmation sampling for the RA Construction. Section 7.0, *Data Interpretation and Compliance Verification* in the Field Sampling and Analysis Plan (ALTA, 1998) sets forth the requirements for compliance with cleanup criteria on the Site. Based on those requirements, and the data presented in the above tables, the Site is in compliance with the criteria. See Section *Statistical Evaluation Of Confirmation Data* below, for an analysis of the data.

4.3 Soil Sampling Procedures

Samples were collected in accordance with Section 4.0 of the Field Sampling And Analysis Plan, Appendix A of the RA Construction Work Plan (ALTA, April 1998). Except as described for samples collected as smear zone sidewall and perimeter samples, confirmation soil samples were collected from 40 by 40 foot quadrants. All confirmation sampling was accomplished on a quadrant by quadrant basis, without grouping quadrants (allowing one sample to represent more than one quadrant). Each quadrant sampled was divided into 16 equal sub-quadrants with a sub-quadrant formed by partitioning each side of the quadrant into 4 parts. Each sub-quadrant was assigned a number, 1 through 16. Using a table of random numbers, a number between 1 and 16 was selected to designate the sub-quadrant to be sampled within a quadrant. This provided a random location within each quadrant for the sample.

The sampling locations within each sub-quadrant were intended to be representative and not regularly or uniformly located within the sub-quadrant, but no rigorous exercise of randomness was used. The samples were taken uniformly from the excavated surface to a depth of six inches below the excavated surface using hand tools or drive samplers. Alternatively, to expedite sample acquisition, a backhoe was sometimes used to excavate a shallow sample hole, within which a sidewall was cleaned with a decontaminated hand shovel to fresh material, and the sample collected at the appropriate depths.

Soil was placed in a stainless steel bowl and thoroughly mixed before placement into an 8 oz. jar and storage in a cooler for shipping to the laboratory. Decontaminated stainless steel spoons were used to collect the samples. Care was taken so that the sample represented all the soil within the depth interval. Because PCBs and lead have very low volatility at normal temperatures, the sample collection process was not overly concerned about exposing soil to the atmosphere.

4.4 Laboratory Analytical Procedures

PCBs were analyzed using gas chromatography by EPA Methods 3550/8082. Lead was analyzed using Inductively Coupled Argon Plasma Emission Spectrophotometer (ICP) by EPA Methods 3050/6010. Analyses were performed using the Quality Assurance procedures set forth in the Construction Sampling QA/QC Plan, Appendix B of the Remedial Action Construction Work Plan (ALTA, April 1998).

4.5 Data Validation

An analysis of analytical testing quality control data was completed for all confirmation samples. A summary of that analysis is presented in this section, with more detail presented in Appendix B, Data Validation Summary Report. Reports addressing each specific data package received from the analytical laboratory were submitted to EPA along with copies of the original laboratory data sheet, in a separate report. (*Laboratory Analysis Reports – Remedial Action Construction*, ALTA, July, 1999).

4.5.1 Data Usability

The usability of Lead and PCB data is a statement about the quality of data and the certainty of the results. The data for the confirmation samples was usable. Since the end use of the data is to meet cleanup action criteria, a high degree of data usability is required. The usability of a data set is based on laboratory precision and accuracy of the data, field precision data, and professional judgement. Sampling and analytical error were evaluated using field and analytical duplicate results. The usability of the data sets was judged from findings presented in individual data validation (DV) reports (see *Laboratory Analysis Reports – Remedial Action Construction*; ALTA, July 1999) and is discussed in Appendix B.

4.5.2 Data Validation

For both PCBs and Lead, holding times, blank contamination, and blank spike recoveries were all acceptable. Completeness for all the data packages was 100 percent.

Some Lead and PCB results were qualified as estimates because accuracy or precision results were outside QC limits or the results were reported at less than the practical quantification limit (PQL). Affected sample results in the laboratory sheets were flagged with a "J." In addition, bias qualifiers are applied to results where appropriate (e.g., "JH" refers to an estimated results biased high). Qualified and non-qualified results are presented in tables in Appendix A.

Accuracy and precision data outside QC limits were often the result of high concentrations of Lead or PCBs in the soil samples or of matrix interference. High environmental concentrations of lead and PCBs interfered with the recovery of spikes and surrogates and led to the dilution of sample digestates and extracts. Matrix interference is believed to have resulted from soil heterogeneity, oil, and/or other unknown artifacts in the soil. There was no indication of chemical interference. High concentrations of the contaminants of concern affected samples that were not used for compliance evaluation. As discussed in Appendix B, despite such problems with a few samples, the data is still usable for all samples.

4.5.3 Sampling and Analytical Error

Statistical analysis of sampling and laboratory error was based on field and laboratory duplicates results. Field duplicates were prepared from field homogenized samples, while laboratory duplicates were prepared from site-specific samples homogenized in the laboratory. For both lead and PCBs calculated z-values for duplicate results were less than their respective Critical z-values; meaning, there were no significant differences between means of field and laboratory duplicate results. Therefore, any sampling or analytical errors can be attributed to chance and not to systematic errors in field or laboratory procedures.

4.5.4 Conclusions

Data validation findings and field and analytical precision data indicate out of limit relative percent difference values for some sample duplicates. In general, RPDs for duplicate samples were acceptable and below the project specified QC limit; however, there were exceptions. These are thought to have resulted from heterogeneous sample material which, despite thorough mixing, could not be homogenized. Overall precision and accuracy data indicate that Lead and PCB sample results are good estimates of their true concentrations and distribution at the Standard Steel site. Statistical analysis of field and laboratory duplicate results indicates that any sampling and analytical error can probably be attributed to

chance. Therefore, Lead and PCB results for Standard Steel Removal Action Construction Phase have a high degree of usability.

4.6 Statistical Evaluation Of Confirmation Data

Cleanup standards for the Remedial Action as set forth in the Record of Decision are described in Section 3.0. The Baseline Human Health Risk Assessment (EPA, 1994a) evaluated existing site risks with respect to industrial/commercial (e.g., short-term and long-term workers and commercial uses) land use scenarios and residential land use scenarios. The industrial commercial land use scenario allows for less restrictive cleanup standards. The HRA was performed prior to the Feasibility Study or determination of the selected remedy. The Record of Decision established cleanup standards based on two future land use considerations:

1. Areas within the "remediation area" (referred to as within the existing EPA fence line) where engineering and land use controls will be applied. This generally conforms to the limits of the consolidation cell as constructed during this Remedial Action; and,
2. Areas outside the remediation area (referred to as outside the then existing EPA fence line). This includes areas beyond the limits of the consolidation cell as constructed during this remedial action and was more stringent than the cleanup standards for the "remediation area" as described above.

As discussed in Section 3.0, the PRP Group elected to apply even more stringent criteria than those required by the ROD. This was done to minimize the need for access restrictions and institutional controls (land use limitations) inside the limits of the consolidation cell and to eliminate the need for access restrictions and institutional controls in other areas. For simplicity, the discussions that follow use the term "industrial" to refer to soil remediation efforts within the boundary of the consolidation cell and "residential" is used in reference to remediation activities performed in areas outside the boundary of the consolidation cell.

4.6.1 Compliance With Cleanup Objectives And Standards

Soil concentrations of lead and total PCBs are in compliance with cleanup criteria when the 95 percent upper confidence limits (UCLs) of the data sets are below residential cleanup objectives and industrial cleanup standards. The residential cleanup objectives for lead and PCBs are 250 mg/Kg and 1.0 mg/Kg, respectively. Areas of the site required to meet these objectives include all soils (to a depth of 3 feet below ground surface) outside the consolidation cell and the Smear Zone. Soil concentrations of lead and PCBs within the limits the consolidation cell and in the Smear Zone are required to meet industrial soil cleanup standards. As promulgated in the ROD, industrial soil cleanup standards for lead and PCBs are 1,000 mg/Kg and 10 mg/Kg, respectively.

4.6.2 Hypothesis Testing

For the Standard Steel site, the null hypothesis states that soil concentrations of lead and PCBs exceed the applicable cleanup criteria (EPA 1989a). The alternative hypothesis is that they do not exceed the cleanup criteria. The Type I error for testing the null hypothesis was 0.05. For lead and PCBs null hypothesis is rejected if the 95 percent upper confidence limits (UCLs) of the data set is less than the cleanup criteria.

4.6.3 Detection Limits

To enhance statistical analysis, the laboratory was instructed not to censure lead and PCB results. Thus, lead and PCB results less than Laboratory Required Reporting Limit (LRL) but greater than the Method Detection Limit (MDL) were reported as estimates.

The MDL was used for statistical analysis when the sample result was reported at less than the MDL. For total PCBs the MDL was 0.1 mg/Kg. In the early part of project (before May 14, 1998) the MDL for lead was 2.6 mg/Kg. Later in the project, MDL for lead changed to 1.3 mg/Kg.

4.6.4 Upper Confidence Limit for Lead

Residential Soil -- The sample data set included 91 uncensored lead results and 22 results reported at less than the MDL. The data set had a lognormal distribution ($r^2 = 0.971$) with a lognormal mean of 41.4 mg/Kg lead. The UCL of the data set is 60.3 mg/Kg.

Industrial Soil -- The sample data set included 90 uncensored lead results and seven results reported as less than the MDL. The data set had a lognormal distribution ($r^2 = 0.949$) with a lognormal mean of 45.0 mg/Kg lead. The UCL of the data set is 64.5 mg/Kg.

4.6.5 Upper Confidence Limit for PCBs

PCB results were neither normal nor lognormally distributed. Therefore, the UCL for PCBs was calculated using a nonparametric method to estimate the UCL for percentiles of the distribution (Gilbert, 1987). For this method, the data was first ordered from the smallest to largest value. Each value was then ranked. The value corresponding to rank of the UCL was then calculated (using the 90th percentile). Ranks of equal value were calculated from the mean of their ranks.

As described in the approved RA Work Plan, Site is determined to reach a point of compliance with 95 percent confidence (when using the nonparametric approach) when:

1. At least 25 % of compliance samples contain no detectable PCBs.
2. No more than 10% of the Site has soil concentrations above the cleanup standard .
3. No location has soil concentrations more than twice the cleanup standard.
4. No soil within one foot of the finished grade of the Site exceeds the cleanup standards.

By inspection, PCB data meets requirements 1, 3, and 4 above. Therefore, the 90th percentile (10 percent) levels were calculated for each condition as discussed below.

Residential Soil -- The sample data set included 69 uncensored total PCB results and 45 results reported at less than the MDL. The UCL on the data set for the 90th percentile was 0.997 mg/Kg.

Industrial Soil -- The sample data set included 77 uncensored PCB results and 25 results reported at less than the MDL. The UCL on the data set for the 90th percentile was 3.49 mg/Kg.

Smear Zone -- The sample data set included 24 uncensored PCB results and 53 results reported at less than the MDL. The UCL on the data set for the 90th percentile was 2.07 mg/Kg, which is below the ROD specified cleanup level.

4.6.6 Summary and Conclusions

For the Standards Steel site, industrial cleanup standards were applied to soils within the limits of the consolidation cell and in the Smear Zone. Residential standards were applied to the remainder of the site. Compliance was achieved when the UCL of the data set was less than the cleanup criteria. The UCL for lead was calculated from the lognormal mean of the data sets. For PCBs, a nonparametric method was applied to calculate the UCL because data sets were neither normal nor lognormally distributed and/or because of a high percentage of censored data results.

The UCLs for lead and PCBs were all less than applicable cleanup criteria. Therefore, based on statistical analysis data sets, lead and PCBs results are in compliance with cleanup objectives and standards.

Soil with concentrations of lead and total PCBs are in compliance with cleanup criteria when the 95 percent upper confidence limits (UCLs) of the data sets are below residential cleanup objectives and industrial cleanup standards. The residential cleanup objectives for lead and PCBs are 250 mg/Kg and 1.0 mg/Kg, respectively. Areas of the site required to meet these objectives include all soils (to a depth of three feet below ground surface) outside the consolidation cell and the Smear Zone. Soil concentrations of lead and PCBs within the limits the consolidation cell and in the Smear Zone are required to meet industrial soil cleanup standards. As promulgated in the ROD, industrial soil cleanup standards for lead and PCBs are

1,000 mg/Kg and 10 mg/Kg, respectively.

The UCL for lead was calculated from the lognormal mean of the data sets. For PCBs, a nonparametric method was applied to calculate the UCL because data sets were neither normal nor lognormally distributed and/or because of a high percentage of censored data results.

The UCLs for lead and PCB data sets, for both industrial and residential soils, were less than applicable cleanup criteria. Lead UCLs for residential and industrial soils were 60.3 mg/Kg and 64.5 mg/Kg, respectively. For PCBs, the UCL for residential soil was 0.997 mg/Kg. For industrial soil within the limits of consolidation cell and in the Smear Zone, the PCB UCLs were 3.49 mg/Kg and 2.07 mg/Kg, respectively.

5.0 SOIL STABILIZATION/SOLIDIFICATION

This describes the soil stabilization/solidification (S/S) work completed during the RA Construction. The text in this section:

- Lists the performance standards given in the ROD (EPA, 1996)
- Describes how the S/S mix design was determined,
- Summarizes the treatment completed
- Presents the results of the quality assurance testing done during construction
- Describes the archived samples for long-term testing

The ROD specified the following minimum performance standards for the treated soils:

1. The Toxicity Characteristic Leaching Procedure (TCLP) test for PCBs shall be 0.5 ug/L or less. For lead the values shall be 5 mg/L or less.
2. The 28 day unconfined compressive strength shall be greater than 50 psi (ASTM Method D2166 or equivalent).
3. The triaxial permeability shall be less than 1×10^{-7} cm/sec (USACE Method 1110-2-1906 or equivalent).
4. PSA Mod. MCC-1 Static Leach Test (U.S. DOE-5820) [... or comparable procedure] This test will demonstrate that the treated soils do not leach lead above 15 ug/L.

The ROD also required additional leaching tests on solidified samples to simulate long-term weathering such as freeze-thaw. The ROD stated that a life expectancy of 1000 years was the design goal. The ROD did not give specific performance standards for PCBs in the static leach test. The treatment goal for PCBs in the static leach test was 0.5 ug/L, which was the same as the performance standard for PCBs in TCLP leachate.

5.1 Treatability Study And Specified Treatment

A design-level treatability study was performed prior to construction. The results of the study are summarized in the following table:

**TABLE 5-1
TREATABILITY STUDY RESULTS**

TEST	OBJECTIVE	MBS RESULTS (2)	MAECTITE RESULTS
TCLP Lead	5.0 mg/L, or less.	0.048 mg/L	< 0.03 mg/L
TCLP PCBs	0.5 ug/L, or less.	0.34 to 0.53 ug/L (1)	0.34 to 0.64 ug/L (1)
Static Leach (ANS) for Lead	0.015 mg/L, or less.	Day 2: 0.020 mg/L Day 5: 0.012 mg/L Day 8 0.015 mg/L	Day 2: 0.013 mg/L Day 5: 0.008 mg/L Day 8 0.008 mg/L
Static Leach (ANS) for PCBs	0.5 ug/L, or less.	Day 2: 0.35 ug/L Day 5: 0.26 ug/L Day 8 0.33 ug/L	Day 2: 0.39 ug/L Day 5: 0.25 ug/L Day 8 0.63 ug/L
Strength	50 psi, or greater.	1,340 psi	1,070 psi
Permeability	1×10^{-7} , or less.	6.7×10^{-8}	4.9×10^{-7}
Dynamic Leach (SBLT) for Lead	None	Day 1: 5.6 mg/L Day 3: 2.8 mg/L Day 5: 1.5 mg/L	Day 1: 8.0 mg/L Day 3: 4.8 mg/L Day 5: 3.0 mg/L
Dynamic Leach (SBLT) for PCBs	None	Day 1: 1.1 ug/L Day 3: 1.2 ug/L Day 5: 1.2 ug/L	Day 1: 1.2 ug/L Day 3: 1.3 ug/L Day 5: 1.4 ug/L

(1) In the first phase, untreated soil with initial PCB concentrations of 1,600 mg/Kg was used which did not meet the TCLP PCB objectives. In the second phase, soil with 800 mg/Kg was used, which achieved the lower results shown in this summary table.

(2) Maectite and not MBS was used in the actual RA Construction.

The design level treatability study was performed in two phases. The TCLP PCB objective of 0.5 ug/L was slightly exceeded in the Phase 1 testing. The untreated soil in the Phase 1 testing had an average total PCB concentration of 1,600 mg/Kg, which was more than twice as high as the PCB concentration of 760 mg/Kg used during the RI/FS study. During Phase 2, the total PCB concentration in the untreated soil was reduced to about 800 mg/Kg by mixing soil with lead greater than 5,000 mg/Kg from Grids C1 and D1. The TCLP PCBs in the Phase 2 treated soil was reduced to less than the objective for all three samples.

In summary, Molecular Bonding System (MBS) or Maectite pre-treated soil combined with 16 percent cement and 8 percent fly ash met the objectives, as summarized above. The permeability of 4.9×10^{-7} in the Maectite mix is slightly higher than the objective of 1.0×10^{-7} ; however, discussions with EPA indicated that they considered this acceptable. Permeability of soil varies over several orders of magnitude with a range of 1×10^{-1} for coarse sand and gravel to 1×10^{-8} for clay and bentonite. Therefore, the slight exceedence of the permeability for Maectite will not have a significant effect on the performance of the monolith, especially when the

added geomembrane cover system is considered.

EPA approved the MBS and Maectite mix design and concurred that the permeability results for Maectite were acceptable. Wilder elected to use the Maectite mix design without further studies to attempt to refine the mix. The application rate for the liquid Maectite solution was 2 percent, by weight, which is the same as used in the treatability study.

The S/S work was done in accordance the Design-Level Treatability Study Report, the Remedial Action Work Plan, and Wilder's Technical Submittals, which were all reviewed and approved by EPA. The reader is referred to the Design Level Treatability Study Report, Appendix H of the Preliminary Design Report for further information.

5.2 Soil S/S Treatment Operation

Soil treatment for lead impacted soils involved excavation and treatment for lead in the individual quadrant where the soil resided, followed by transportation to a stockpile and treatment in a pugmill. PCB impacted soils were excavated and transported to a stockpile, then treated in a pugmill.

5.2.1 Pugmill Set-Up And Operation

A pugmill and adjacent stockpile was set up in the northeast corner of the site. The location for the pugmill was paved with asphalt concrete on 6/17/98 and plant setup started on the following day. A flyash vault was constructed (starting on 6/25/98) in the railroad spur line immediately adjacent to the plantsite, for use in off-loading railcars loaded with flyash. The plant started operations on 7/8/98 and continued operating until 9/2/98, with some down days for site workload balancing. During the initial set-up of the plant, considerable effort was put into testing the system and assuring that appropriate soil treatment was completed. The plant was demobilized starting 9/2/98 and this work was completed by 9/15/98.

Within roughly the same timeframe as set-up of the pugmill, the adjacent S/S soil stockpile was developed. An impermeable heavy gauge plastic liner was installed, with soil berms and concrete highway barriers around the perimeter. S/S soil previously excavated had been stored in an unlined stockpile on impacted quadrants. This material was transferred to the lined stockpile as soon as it was available.

5.2.2 Soil Treated For Lead

The Contractor used a two-step treatment process for lead impacted soils. In step 1, soil with greater than 1,000 mg/Kg lead was treated with Maectite to stabilize the lead. The soil in each 40 by 40 foot quadrant was carefully excavated with a hydraulic excavator and placed into one pile near the center of a quadrant. The

liquid Maectite reagent was pumped through a hose and sprayed onto the pile. The soil and reagent were mixed with an excavator. Mixing quality assurance was based on visual observation of consistent color change. The soil and reagent was considerably darker than untreated soil and visible streaks were obvious in soil not well mixed.

The amount of reagent per quadrant layer was calculated for each location prior to application. Initially, field density tests were performed to establish the soil unit weight. Since the soil unit weight was 119 to 127 pounds per cubic foot, ALTA and Wilder agreed to use a unit weight of 130 pounds per cubic foot (pcf) in computing weight of Maectite needed. The design-level treatability study demonstrated that 2 percent Maectite would meet the objective for lead stabilization. For a 40 foot by 40 foot by 6-inch quadrant, the soil weight was calculated to be 104,000 pounds. The ground surface elevations were measured by Wilder's grade checker before and after excavation of each layer in each quadrant. They used a laser level system, which measures elevation with an accuracy of 0.01 feet. Therefore, for every quadrant-layer, 2,080 pounds of Maectite solution were mixed into the soil, which was three (3) 700 pound drums. Since all Maectite was delivered in 55-gallon drums, the quantity of Maectite was easy to measure. Wilder used three drums on all quadrant layers. A total of 202 quadrant layers were treated with a total of 419,370 pounds of Maectite solution.

5.2.3 S/S Treatment

Soil that required solidification with cement and flyash (i.e. soil with PCBs greater than 50 mg/Kg or Maectite-treated soil) was placed into one S/S stockpile in the northeast corner of the Site. The stockpile area was covered with black plastic prior to placing the S/S soil to prevent contamination of the underlying soil.

S/S soil was solidified during two time periods. The pugmill solidification system treated soil from July 7 to July 18, 1998 and from August 10 to September 2, 1998. Treatment was done as described in the EPA-approved work plans. The first step was screening to remove cobbles and debris larger than about 2 inches. The material larger than the screen was incorporated into the treated S/S soil in the Consolidation Cell. From the screen, the soil was transported by conveyor to the pugmill. Cement and fly ash were transported from storage silos into the pugmill and mixed with the soil and water. The quantities of soil, cement, flyash, and water were measured and controlled as discussed in the following section.

After mixing, the treated soil was picked up with a loader, transported to the Consolidation Cell, spread with a dozer, and compacted with a smooth-drum roller. The compacted soil was tested as described in the following section.

5.3 S/S Soil Quality Assurance Testing

The approach to Quality Assurance testing proposed in the Preliminary Design Report and in the Remedial Action Work Plan focused on controlling the S/S process. For this project, the approach used was to implement soil treatment with methods used in the treatability study and monitor procedures. During the soil treatment, ALTA, and Wilder collected and evaluated the following data to ensure that the soil treatment was done with the treatability study methods:

- Monitoring the weights of S/S agents, soil and water used with each batch of Maectite application or daily summary of pugmill solidification
- Continuous monitoring by Wilder of materials weights used in solidification
- Visual confirmation that the materials were well-mixed by observing for consistent color of the mix and absence of lumps of dry material
- Observation and recording of mixing equipment and procedures used
- Observation and recording of compaction equipment and procedures
- Field measurement of compacted unit weight and water content

The weights of soil, cement, and flyash were continuously monitored using automatic gauges on the conveyor belts feeding the pugmill. The weight measuring system was calibrated at the start of the project by sending one truckload of sand with known weight through the conveyor system. The total weight of soil treated was 21, 184 tons. The soil was treated with 3,325 tons of cement, 1,689 tons of flyash, and 13.9 tons (3,330 gallons) of water.

Field moisture and unit weight testing were performed on compacted S/S treated soil. As stated in the Geotechnical Quality Control Plan, unit weights were measured by ALTA at least once for every 1,000 cubic yards of treated soil. The results of unit weight and moisture content tests on compacted S/S soil are shown in Table 5-2. A total of 30 field tests were taken during the 28 days of soil solidification and compaction. Testing used the lighter ASTM D698 standard (ASTM D1557 was used for soils) to avoid over-working the soils during compaction. All the tests, except one, showed that the soil compaction met or exceeded the required level of 95 percent of the maximum laboratory unit weight. In the area that failed, a level of 91 percent relative compaction was obtained, and the area was re-compacted. The average compaction for all S/S soils was found to be 99%. Due to increased rock content in the S/S soils, a second lab curve was necessary in the latter days of treatment.

Table 5-2
S/S SOIL COMPACTION TESTING

DATE	TEST NO.	MAX. DENSITY	FIELD MOISTURE	FIELD DRY DENSITY	PERCENT COMPACTION
14-Jul-98	1	124.0	14.3	118.1	95
	2	124.0	12.9	119.5	96
	3	124.0	13.0	118.7	96
	4	124.0	13.3	119.9	97
20-Jul-98	1	124.0	10.1	118.3	95
	2	124.0	13.2	112.5	91
	3	124.0	12.3	121.4	98
	4	124.0	11.8	118.5	96
11-Aug-98	1	124.0	6.5	132.3	107
	2	124.0	6.5	123.5	100
12-Aug-98	1	124.0	6.1	128.1	103
	2	124.0	6.1	129.2	104
13-Aug-98	1	124.0	8.9	133.4	108
	2	124.0	8.9	128.8	104
14-Aug-98	1	124.0	9.6	127.1	103
	2	124.0	8.1	135.5	109
20-Aug-98	1	124.0	10.9	125.0	101
	2	124.0	12	121.7	98
24-Aug-98	1	131.5	8.4	131.5	100
	2	131.5	10.6	132.0	100
	3	131.5	9.6	133.0	101
26-Aug-98	1	131.5	11.1	126.8	96
	2	131.5	9.9	129.3	98
	3	131.5	10.7	130.8	99
28-Aug-98	1	131.5	10.8	125.6	96
	2	131.5	10.9	125.9	96
	3	131.5	9.7	124.6	95
31-Aug-98	1	131.5	10.1	127.3	97
	2	124.0	10.3	119.9	97
	3	131.5	11.0	125.4	95
				AVERAGE	99.0

5.4 Concrete Archive Cylinders

The SOW required that one batch of cylinder specimens be prepared for every 1,000 cubic yards of treated soil. A total of 464 quad layers of soil were solidified, which is approximately 14,000 cubic yards. ALTA prepared 14 batches of test specimens for the project. Each batch of specimens contains nine (9) four-inch diameter by 8 inch high cylinders and nine (9) two-inch diameter by 4 inch high cylinders. Therefore, a

total of 126 four-inch and 126 two-inch diameter cylinder were prepared. Table 5-3 lists the archived cylinders.

Table 5-3
LIST OF ARCHIVED CYLINDERS

DATE COLLECTED/ CYLINDER LABEL	NUMBER OF 4" X 8" CYLINDERS	NUMBER OF 2" X 4" CYLINDERS
7/15	9	9
8/11 (A)	9	9
8/11 (B)	9	9
8/12 (A)	9	9
8/12 (B)	9	9
8/13 (A)	9	9
8/13 (B)	9	9
8/14 (A)	9	9
8/14 (B)	9	9
8/24	9	9
8/25	9	9
8/26	9	9
8/31	9	9
9/1	9	9

Each batch of cylinders contains specimens suitable for testing using the same methods as used in the Design Level Treatability Study (ALTA 1997). The post-construction tests that may be required are:

- Toxicity Characteristic Leaching Procedure (TCLP).
- Unconfined compressive strength.
- Hydraulic conductivity.
- American Nuclear Society (ANS) Method 16.1 for Leachability of Solidified Waste.

Each batch of cylinders contains three (3) sets of test specimens. Each set contains three (3) four-inch diameter and three (3) two-inch diameter cylinders. The cylinders in each set were prepared for the following tests:

- One two-inch diameter cylinder for TCLP leaching.
- One two-inch diameter cylinder for ANS leachability.
- One spare two-inch diameter cylinder.
- One four-inch diameter cylinder for compressive strength.
- One four-inch diameter cylinder for hydraulic conductivity.
- One spare four-inch diameter cylinder

A sample storage vault was constructed near the northwest corner of the consolidation cell. The vault consisted of a manhole base section approximately 4-feet inside diameter and 5-feet deep, constructed of 4-inch thick concrete. It has a concrete bottom and is covered with a 4-inch thick concrete lid having a standard heavy steel lid in the center for access.

According to the SOW, two of the sample sets were to be placed in the on-site storage vault, and the third set was to be archived elsewhere (not specified). At the Prefinal Construction Inspection, EPA and the PRP Group agreed that the third set of samples would be archived along with the other two samples in the storage vault.

The sampled material was stored on-site in a secure storage area until near the end of the RA Construction, when they were placed in the storage vault. This vault is located near the northwest corner of the consolidation cell, as shown on Figure 8-1, *Final Contours, Consolidation Cell*. Each cylinder was given a label that identified the project and nature of the sample, along with the sample date/number. Cylinders within each batch were separated into sets of three and each set was given the designation 1 of 3, 2 of 3, or 3 of 3. Each set, of three 4-inch diameter and three 2-inch diameter cylinders was placed in a double thickness heavy plastic bag, secured with strapping tape and given a water-proof label. The outside of the vault was insulated with 4-inch closed-cell foam. A wooden frame was constructed inside the bottom of the vault to keep samples off the soil. One 4-inch thick layer of closed-cell foam was placed in the bottom on the vault. Two layers of 4-inch thick closed-cell foam were placed on top of the samples.

The 4" by 8" samples were taken according to ASTM D-558, which involved making three lifts of material in the cylinder, each compacted with 25 blows using a Standard Proctor hammer which is the same procedure as in the ASTM D-698 laboratory test for moisture-density. If the cylinder mold had been steel, as that used for the actual D-698 test, theoretically, the material would have been compacted to 100 percent relative compaction. However, since the plastic mold deforms slightly when soil is compacted in it, there is some variation from the 100 percent figure. Since the required minimum field compaction for the S/S material was 95 percent and actual values ranged from 91 to 109 percent, with a 99 percent average, the plastic cylinder samples represent a reasonable approximation to the field densities for this material. The 2" by 4" cylinders were compacted by using a wooden rod with a blunt end, but not to any particular standard, only firm and dense.

All cylinders were placed inside the buried concrete manhole storage vault on the Site. Insulation was placed on the bottom and outside of the vault. Eight inches of rigid insulation was placed over the cylinders. The goal was to make the temperature conditions inside the vault similar to the temperature conditions of the S/S soil in the Consolidation Cell (which is under three feet of soil cover and four inches of rigid insulation). The vault can be accessed through a steel manhole cover. The vault is protected by four steel bollards around the vault.

6.0

UXO SCREENING AND DISPOSAL

The term "UXO" refers to unexploded military ordnance items. It also is applicable to items that cannot be determined to be inert without close examination by an expert, or to items that cannot be certified inert even upon examination by an expert. These items may in fact be inert, but must be treated as live until certified inert, whereupon they are classified as "Ordnance Related Scrap" and may be disposed of ordinarily.

The salvage operation run at the Site collected a number of military surplus materials, the majority of which were removed from the Site during junk removal operations prior to the RA Construction. Included in that junk were hundreds, perhaps thousands of steel artillery and recoilless rifle shell casings. These are believed to be World War II and Korean Conflict vintage items. Some of these had been removed by EOD personnel from Fort Richardson, but the majority went to a scrap metal recycling facility along with other junk. This work was all completed without incident and there were no recorded discharges of ordinance items associated with the work.

It was known during the development of the RA Design that additional shell casings were present on the Site because these had been observed in debris piles and partially buried in the ground. Based on the previous experience with these items, there was apparently no reason to develop special handling measures, they were to be treated as ordinary junk, and placed in the consolidation cell. However, during review of the RA Construction Work Plan, U.S. Army Corps of Engineers reviewers strongly indicated that all shell casings must be treated as potential UXO items until certified as inert by a UXO technician or supervisor. The implications of this were:

1. Soils removal could not proceed in a given area until it had been surveyed by a UXO expert and any items identified were certified inert.
2. Numerous surface debris piles had to be screened under the supervision of a UXO expert, and the shell casings set aside for examination.
3. Portions of the Site, in the SW corner, and across the South side, were found to contain significant numbers of buried shell casings. This meant that these areas also had to be carefully excavated, under the supervision of a UXO expert, and the materials screened to remove shell casings. The depth of these excavations varied from about 12 inches to 36 inches, depending on where the UXO items were encountered.

The excavation and screening operations had to consider the type of soil (consolidation or S/S soil) within the areas of these operations. This made the work more complicated, but it still proceeded very well. In addition to the shell casings that were known to be present, a number of other items were encountered. These

are tabulated in the following table, along with an indication of the area of identification:

**Table 6-1
IDENTIFIED UXO ITEMS**

TYPE UXO	ON-SITE HAZARD IDENTIFIED	LOCATION FOUND	
		*Primary	**Secondary
75mm shell casings	None	2	1,3,4,5
105mm shell casings	None	5	1,4
106mm shell casings	None	5	1,2,4
90mm shell casings	None	5	4
60mm shell casings	None	5	
40mm shell casings	None	3	4,5
20mm Projectiles	HE and HE-I	1	2,5
40mm Projectile	None	3	
2.36" Rocket	Unknown	5	3
Rifle Grenades	None	3	4,5
100mm bomb fuses	None	2	4,5
3.5" Bazooka	None	1	
Anti-Tank Mines	None	5	
2.75" Rocket Warhead	None	3	5

* Primary location is that location where the majority of any one type of item was found

** Secondary is the area that smaller quantities of the UXO items were found

Locations: 1=20mm site, F4, F5; 2=B-D, 4-5; 3=Grids 5D and 6D; 4=Throughout site;
5=Surface Piles

It should be noted that none of the shell casings had projectiles in place, and no items were identified as having live explosive charges. Many shell casings were considered questionable with respect to having unexploded primers or flashtubes and these were detonated using detonation cord before being certified inert. One of the bazooka rockets could not be determined to be inert and was destroyed onsite in a bunker by EOD personnel from Fort Richardson.

During soils removal operations in a portion of the Site where very few UXO items had been found on the surface (Grids F4 and F5), a deposit of 20mm projectiles was encountered. These projectiles were unfired and all the rotating bands were unmarked. The shell casings were missing and the projectiles were in various states of corrosion. The external features indicated that these projectiles could be of three types, the M96 Incendiary, the M97 High Explosive Incendiary or the M99 Practice. The external features of these projectiles are identical. Without the ability to identify which types, safety precautions had to be followed for all, using the procedures for the M97 (the most hazardous).

A 1.3" thick Viraguard polycarbonate blast shield was installed on the front of the excavator to protect the operator. Questionable areas in the vicinity of the original 20mm find were excavated from inside of a heavy steel trench box to minimize the potential for damage on adjacent properties. The excavated soil was carefully screened to remove projectiles, and the material coming off the screen was hand sorted. All work was done at night, to minimized potential impacts to the RA Contractor's day-shift personnel. During the screening operation, approximately 25,000 of the 20mm projectiles were discovered. It should be noted, although these were treated as potentially live, this was never confirmed to be the case, and there were no accidents or explosions during the work.

A transportable explosive magazine storage container was rented for the duration of the 20mm operation. This was used to store the projectiles, which were bagged in heavy cotton bags for handling. After the operation was completed, it was determined that the EOD unit from Fort Richardson would assume responsibility for final disposal of the 20mm items and they were removed to government storage facilities.

7.0

OFFSITE DISPOSAL

7.1 Offsite Junk Disposal

Non-impacted scrap metal was removed from the Site early in the RA Construction. This was material that had virtually no contact with Site soils and was left by previous subtenants of the parcel at the west side of the Site. It went to a scrapyard for recycling. Later in the RA construction, steel rails from the spur line that entered the Site were recycled at a scrapyard. These rails were pressure washed after removal from the ground and tested by wipe test kits. The results of that testing were as follows:

Sample W-1	78.28 ug
Sample W-2	72.80 ug
Sample W-3	61.20 ug
Sample W-4	565.00 ug

Since the criteria for re-use of these rails offsite, as established by EPA regulations, was that PCBs must be less than 10 ug per 100 square centimeters of surface area, all the rails failed the wipe tests and could not be reused. Because criteria for disposal at a scrapyard are based on the ratio of the weight of contaminant to the weight of the scrap, the rails could easily pass and they were disposed of at a scrapyard. Approximately 20,000 pounds of steel rails were sent to Alaska Metal Recycling.

7.2 Drum Removal

A total of 18 drums of water with PCBs were generated during the dewatering of smear zone removal soils. These wastes were placed in DOT approved drums and disposed of by incineration at the Laidlaw Environmental Services facility at Aragonite, Utah. The empty drums were disposed of at the Safety Kleen Grassy Mountain Facility in Clive, Utah. See Appendix C for copies of the manifests and disposal certificates.

7.3 Buried Tank Disposal

On October 13, 1998, a previously abandoned steel tank was removed from the quadrant C0SE. This tank had no connecting pipes and had been perforated and the top crushed. Apparently there was some quantity of unknown petroleum in the tank when it was abandoned and the perforations let in water infiltrating above the tank. At time of removal, about 100 gallons of watery sludge was pumped from the tank and placed in drums for appropriate offsite disposal. The tank was cleaned and cut into segments for disposal at a scrapyard. The tank subgrade soil and sludge from the tank were sampled for gasoline and diesel range organics, BTEX, EPA 8260 Compounds, PCBs, and lead. The results of this testing were as follows:

Table 7-1
TANK REMOVAL TESTING
 (Results All In mg/kg)

	EAST-BOTTOM	WEST-BOTTOM	TANK SLUDGE
ANALYTE			
Gasoline Range HC	15.0	ND	4,660
Diesel Range HC	ND	ND	3,990
Heavy Oil Range Hydrocarbons	ND	ND	248
Benzene	ND	ND	ND
Toluene	ND	ND	61.3
Ethylbenzene	ND	ND	68.6
Xylenes (total)	ND	ND	464
EPA 8260 COMPOUNDS	ND (All)	ND (All)	ND Except:
Toluene			12.9
Ethylbenzene			21.3
Xylene, m-p			108
Xylene, o			41.9
n-Propylbenzene			24.6
1,3,5-Trimethylbenzene			67.2
1,2,4-Trimethylbenzene			239
p-Isopropyltoluene			7.9
n-Butylbenzene			25.9
Naphthalene			60.9
PCBs (Total)	ND	0.427	ND
Lead (Total)	27	8.87	62.7

Note that the tank sludge was collected in drums and disposed of off-site, as appropriate for the determined contents. The East-Bottom and West-Bottom samples were from soil immediately below the location of the tank before its removal. No soil was removed as part of the tank remediation. The tank and associated sludge were disposed of at Alaska Pollution Control, Inc., of Anchorage, Alaska. Copies of the disposal certificate are included in Appendix C.

7.4 Water Treatment And Disposal

Most decontamination water from the Site decontamination operations was recycled back to the S/S (untreated) soil stockpile. Therefore, offsite disposal of this water was not an issue. In order to dewater portions of the smear zone excavation, it was necessary to store and treat 534,640 gallons of water. Water was pumped from shallow screened wells inside the cofferdam area or from sumps in the smear zone area outside the cofferdam. It was stored until batch processed through filtration and carbon absorption tanks. Then it was stored, tested, met criteria, and finally discharged to the sanitary sewer.

Water to be discharged was pumped through 3" diameter HDPE pipe from the Site to the corner of Post Road and Yakutat Street for discharge to the sewer. A permit was received by the PRP Group from the Anchorage Water and Wastewater Utility (AWWU) for the discharge. AWWU effluent water quality criteria received as conditions of the permit were easily met, except for PCBs. The PCB maximum concentration goal was 0.001 mg/L. After initial testing indicated the treated water was exceeding this value, discussions were held with AWWU, EPA, and the treatment subcontractor, Alaska Pollution Control (APC). It was the position of APC that it was technically impractical to meet the initial specification and that a higher value was needed. AWWU and EPA agreed to increase the discharge limit to 0.02 mg/L PCBs. Subsequent testing indicated no exceedences of this value.

8.0

CONSOLIDATION CELL CONSTRUCTION

8.1 Elements of the Cell

Figure 8-1 presents a plan view of the consolidation cell location, including limits of the fill material and top of cover limits. Figure 8-2 presents a schematic cross-section of the consolidation cell. This system consisted of the following components (top down):

- Three feet of compacted sandy gravel cover soil.
- A two-sided geocomposite drainage layer
- 40-mil Seamans XR-5 geomembrane cover
- Closed cell foam insulation
- S/S treated impacted soil
- Untreated Consolidation Soil
- Subgrade soils

In addition, around the southern perimeter and wrapping up both east and west sides an erosion control wall was constructed to protect the cell. This structure is discussed in a later section. Topsoil was placed on the sideslopes of the cell prior to hydroseeding.

8.1.1 Consolidation Cell Subgrade

Subgrade soils below the consolidation cell consisted of native in-place sands and gravels, coarse granular fill placed as backfill in the smear zone excavation, and sandy gravel fill making up the dike along the south side of the cell (between the cell and the erosion control wall. Fill placed in the cell subgrade was compacted to a density in excess of 90 percent relative compaction, to minimize future settlement of the cell. Native in-place soil was found to be sufficiently dense so that it did not require additional compaction.

The design called for locating the cell bottom 1 foot above the high groundwater level, based on the water level records presented in the Remedial Investigation Report (WCC, 1994). Upon excavation to the specified depth, it was determined that the actual water level at the time was very close to the anticipated high level. Therefore, no adjustments in the cell base elevations were required, since a 1 foot separation was present. Figure 8-3 presents the consolidation cell bottom elevations prior to placement of impacted backfill soils.

8.1.2 Consolidation Soil

Excavated soil having less than 50 mg/kg PCBs or 1000 mg/kg lead (but exceeding removal criteria) was placed in the consolidation cell and designated "consolidation

soil". A total of 681 Quad Layers or approximately 32,700 tons of soils was placed with this designation. As discussed above, consolidation soils excavated during the UXO investigation and piles of mixed debris and soil were screened, however, other consolidation soils were not screened for debris or oversized material. Prior to the time when initial portions of the consolidation cell bottom were opened up, consolidation soil had to be stockpiled. After that time, such soils were moved by truck directly from the soils removal area to the cell. Once there, the material was spread by dozer, and compacted with a vibratory steel drum roller. Other than wetting for dust control, addition of water for soil compaction was not necessary, since the natural moisture was found to be sufficient.

Moisture-Density (compaction) field testing was performed periodically during the process of placing the consolidation soil fill. Table 8-1 presents field compaction testing results for this material. Figure 8-4 presents the elevations for the top of the consolidation soil layer.

Table 8-1
CONSOLIDATION SOIL COMPACTION TESTING

TEST DATE	MATERIAL TYPE	RELATIVE COMPACTION (PERCENT)	REQUIRED COMPACTION (PERCENT)	LAB STANDARD
02-Jul-98	Consolidation Soil	94	90	D1557
	Consolidation Soil	92	90	D1557
	Consolidation Soil	98	90	D1557
	Consolidation Soil	96	90	D1557
14-Jul-98	Consolidation Soil	92	90	D1557
	Consolidation Soil	89	90	D1557
	Consolidation Soil	92	90	D1557
	Consolidation Soil	98	90	D1557
	Consolidation Soil	93	90	D1557
22-Jul-98	Consolidation Soil	92	90	D1557
	Consolidation Soil	91	90	D1557
	Consolidation Soil	90	90	D1557
11-Aug-98	Consolidation Soil	98	90	D1557
13-Aug-98	Consolidation Soil	92	90	D1557
	Consolidation Soil	94	90	D1557
20-Aug-98	Consolidation Soil	94	90	D1557
	Consolidation Soil	97	90	D1557
MEAN VALUE		95.5		

8.13 S/S Treated Soil

Excavated soil having greater than 50 mg/kg PCBs or 1000 mg/kg lead required treatment before it could be placed in the consolidation cell. Section 5.0 discusses the nature of the treatments. A total of 464 Quad Layers or approximately 22,272 tons of material were treated and placed in the cell. Soils being removed for lead >1000 mg/kg were treated in their respective quadrants prior to other handling. All S/S removal soils were screened over a two inch screen and the soil passing the screen went for S/S treatment at the pugmill. The oversized material was placed in the consolidation cell as interlayers between treated S/S soil. Section 5.0 presents information relating to the compaction testing for this soil. Figure 8-5 presents the top of S/S layer elevations.

8.1.4 Geomembrane System Components

The geomembrane system was placed directly on top of the cured S/S treated soil. It consists of the following components (top, down, see Figure 8-2):

- Two-sided geocomposite
- 40-mil geomembrane
- 4-inch thick foam insulation

The consolidation cell was covered with 40-mil XR-5 geomembrane, a reinforced chemical and oil resistant product from Seaman Corporation. This material was delivered to the Site in 15 prefabricated panels and remaining seams were fabricated in place. Quality control documentation is discussed in the next section. The purpose of the geomembrane layer is to reduce infiltration of surface water into the consolidation cell. This hydraulic isolation helps to minimize the potential for chemical interaction of consolidated soils with groundwater, and subsequent offsite migration of impacted groundwater. It also reduces the potential for water coming into contact with the S/S treated soil and causing disruption of the material through freeze-thaw action.

Overlying the geomembrane, a layer of geocomposite drainage material was installed. This material was delivered to the Site in 20-foot-wide rolls and overlapped 1-2 feet at the edges. Geocomposite consists of a geonet drainage material in the middle and 8 oz/sq yd non-woven geotextile thermally bonded on each side. The geonet is a High Density Polyethylene (HDPE) material with strands bonded together in a bias-ply orientation, such that water can pass through the material parallel to the layer as well as in a transverse direction. Placing this material on top of the geomembrane barrier layer makes it easier for water that has infiltrated the surface cover soil to move laterally off of the barrier layer to lateral drains. The geotextile layer under the geonet serves to cushion the geomembrane from sharp edges on the HDPE geonet. The geotextile layer overlying the geonet helps keep the geonet free from soil plugging from overlying cover layer.

The area underlain by S/S treated soil was covered with 4-inch thick extruded polystyrene closed cell insulation boards. The material was placed in 4-inch thick by 4-foot by 8-foot panels directly on top of the S/S material. The product used was Foamular 400, manufactured by Owens Corning (UC Industries, Inc.). The purpose of this material was to reduce the number of freeze-thaw cycles to which the S/S treated soil mass would be subjected over a long period of time. The thickness of insulation was not intended to prevent freezing in the consolidated material.

8.1.5 Geomembrane Field Quality Control Testing

The following QC information was provided by the installer regarding the geomembrane system and has been entered into the project records:

- Certificate of Acceptance Of Soil Subgrade Surface
- Foam Insulation Panel Layout
- Geosynthetics Inventory Log
- Prefabricated Geomembrane Panel Sizes and Layout
- Geomembrane Deployment Log
- Geomembrane Seam Log
- Geomembrane Trial Seam Log
- Geomembrane Air Lance Test Log
- Geomembrane Destructive Test Report
- Geomembrane Defect Log
- Geomembrane Repair Log
- Certificate Of Final Inspection and Acceptance of Geosynthetic Installation

Destructive seam testing performed during the geomembrane installation indicated acceptable (passing) peel test results for the seams tested. Air lance testing of the installed, seamed geomembrane detected several areas requiring repair work; these were documented in the defect and repair logs. Final inspection and acceptance of the geomembrane cover was certified by the Layfield Plastics (installer) construction coordinator. Final installation (after repairs) met the project requirements as set forth in the project specifications.

8.1.6 Geomembrane Cover Soil

The design called for placement of a total of 3 feet of cover soil over the geomembrane cover system. The first 18 inches of this material was screened to 1-inch minus gravelly sand and placed with no compaction until the full 18-inches was laid down. The second 18-inches was placed in two lifts of 9-inches each. This material was a pit run sandy gravel. Both materials had less than 5 percent fines, so as to be relatively free draining. Table 8-2 presents information relating to the compaction testing for this soil. All compaction tests met the project requirements as set forth in the project specifications.

Table 8-2
GEOMEMBRANE COVER
SOIL COMPACTION TESTING

TEST DATE	MATERIAL TYPE	RELATIVE COMPACTION (PERCENT)	REQUIRED COMPACTION (PERCENT)	LAB STANDARD
22-Sep-98	1st 18" Layer, GMCS	97	90	D1557
	1st 18" Layer, GMCS	98	90	D1557
	1st 18" Layer, GMCS	95	90	D1557
	1st 18" Layer, GMCS	96	90	D1557
	1st 18" Layer, GMCS	97	90	D1557
		95	90	D1557
25-Sep-98	1st 18" Layer, GMCS	96	90	D1557
	1st 18" Layer, GMCS	92	90	D1557
	1st 18" Layer, GMCS	96	90	D1557
	1st 18" Layer, GMCS	91	90	D1557
MEAN VALUE		95.3		
10-Oct-98	Top Surface, GMCS	95	95	D1557
	Top Surface, GMCS	95	95	D1557
	Top Surface, GMCS	100	95	D1557
	Top Surface, GMCS	95	95	D1557
	Top Surface, GMCS	99	95	D1557
	Top Surface, GMCS	96	95	D1557
	Top Surface, GMCS	95	95	D1557
	Top Surface, GMCS	96	95	D1557
MEAN VALUE		96.4		

8.1.6 Topsoil

A sandy silt with organic material was placed on the consolidation cell sideslopes to serve as a growing medium for hydroseeded grass. Since the plant species used are relatively shallow-rooted, 4-inches of topsoil was considered adequate for this layer. No compaction, other than track-walking, was performed, to assure a good seedbed for the plants. These features of the construction are discussed in more detail in Section 9.0, Landscaping.

8.2 Erosion Control Wall

The location of the erosion control wall is shown on Figure 8-1. This structure was required to protect the consolidation cell from erosion by Ship Creek, under conditions of (at a minimum) the 500-year flood, as described in the Preliminary Design Report for the project. As shown on the cross-section, Figure 8-6, the erosion control wall consisted of the following components:

- Subgrade soil fill
- Geotextile separation fabric
- Riprap bedding stone
- Riprap footing stone
- Riprap armor stone
- Wall backfill soil

The subgrade soil fill was not surveyed to determine an accurate quantity, but is estimated to be several thousand cubic yards of material. It consisted of both imported soil and soil excavated from below previously remediated areas on the Site. It was necessary to place this material as backfill in low-lying remediated portions of the Site and to raise the soil berm between the consolidation cell and the erosion control wall to allow placement of riprap for the wall well above the adjacent ground level on the south side.

Geotextile separation fabric was placed on the wall subgrade soil to prevent intrusion of soil fines into the riprap stone, and subsequent degradation in the strength and durability of the wall. The project specifications called for Amoco 2006 or Synthetic Industries 300ST, or equal, which is a heavy woven geotextile commonly used in such conditions. The specifications called for sewing together adjacent rows of the material to avoid gaps. At the request of the RA Contractor, in place of sewed seams, an additional width of overlapped material (2-3 feet) was used and special care was taken during placement of the bedding rock to avoid creating any gaps.

Riprap and bedding rock used on the wall was purchased from DAMCO Paving, Anchorage, Alaska. It was mined from the Eklutna Quarry, located approximately 20 miles east of Anchorage. This quarry was owned by the Alaska Railroad Corporation and operated by DAMCO. Stone was graded for size at the quarry, shipped to Anchorage in rail cars, and trucked to the Site in end-dump trucks. The stone supplied was a hard, angular, durable, diorite or granodiorite granitic rock that was only slightly weathered and fractured. Approximately 13,780 tons of rock was used.

Approximately one-foot of bedding stone was placed on the geotextile fabric as the base-course of the riprap. Bedding stone is important as a foundation of the larger overlying stones, and is required for long-term functionality of the wall. The stone

used was graded as 2-inch to 6-inch size material. The base of the excavation for the wall was located approximately 10 feet below the creekbed at its closest approach to the wall. This was intended to be well below the scour depth of the creek during flood-stage.

The largest material placed was toe rock along the base of the wall. A layer approximately 4-5 feet thick and 10-12 feet wide was placed in the base of the excavation for the wall. Near the southeast corner of the wall, where the creek would impinge on it during flood-stage, this layer was made even wider and thicker, as an extra precaution. The purpose of using very heavy, large rock at the base of the wall is to minimize the possibility that the base of the wall would be undermined by stream erosion in case of a severe flood. The material specified was Alaska DOT Class IV, which is to be evenly graded from about 400 to 5,400 pound rock, with at least 50% of the pieces weighing 2,000 pounds.

On top of the bedding rock and Class IV riprap, approximately four feet of armor rock was placed. The material specified was Alaska DOT Class III, which is to be evenly graded from about 25 to 1,400 pound rock, with at least 50% of the pieces weighing 700 pounds.

Outside of the constructed wall, soil backfill was placed to bring the area up to the surrounding ground level. Some of this material was imported soil and some of it was uncontaminated soil excavated from areas previously remediated on the Site. The area was graded to drain away from the riprap wall and toward the southwest corner of the Site, into a natural drainage swale.

9.0 SITE RESTORATION

Restoration of the Site at the conclusion of the RA Construction involved the following earthwork and revegetation tasks:

- Backfilling Excavations
- Site Grading And Drainage
- Ship Creek Riprap Removal
- Ship Creek Bank Restoration
- Topsoil Placement
- Landscape Boulders
- Hydroseeding
- Planting Trees And Shrubs
- Consolidation Cell Access

These will be discussed in the following sections.

9.1 Backfilling Excavations

Excavations made for soils removal and construction of the consolidation cell were backfilled with imported gravely sand soil and onsite non-impacted soils adjacent to the excavations. Several thousand tons of imported soil were used for this purpose. Approximate locations of backfilled areas include the northeast corner of the Site, along the east (Yakutat Street) side, and across the southern side of the Site below the erosion protection wall. Fill placed in areas where the potential exists for future buildings to be located, and areas to be used by vehicles was compacted in 8 to 12 inch lifts using a vibratory steel roller.

9.2 Site Grading And Drainage

The design of the consolidation cell implemented a requirement in the Record of Decision (EPA, 1996) to avoid having surface drainage water flow directly from the cell to Ship Creek. Figure 9-1 shows the locations of surface drainage ditches and subsurface piping. The eastside structure is a rock-lined ditch that flows north to south and enters a 24-inch culvert near the southeast corner of the cell, then it flows a short distance to Ship Creek. This culvert predates the RA Construction and was used to carry surface water from Post Road and northward. The RA Construction removed approximately 200 feet of this pipe due to construction of the erosion control wall, and re-routed the pipe to the east down Yakutat Street. Approximately the south 40 feet of pipe and the pipe discharge was not removed during the construction, and is now in service for the ditch water.

The westside structure is a rock lined ditch that flows north to south, picks up the anchor trench pipe discharge and continues to a discharge point in the southwest

corner of the Site. The discharge point is into a natural swale trending southwest off the Site.

Runoff from the top surface of the cell is directed toward the north, where it is intercepted in a swale and diverted to ditches that run along the east and west sides of the cell. Major areas of the Site outside the consolidation cell drain toward the south and the east, finally arriving at the natural swale where the westside pipe discharges.

Subsurface water intercepted by the top surface of the geomembrane cover systems will make its way toward the north over that surface or toward the east or west if near the cell sides. At the limits of the cell on the west, north, and east sides, there is an anchor trench for the geomembrane cover. In that anchor trench, a 6-inch heavy gauge HDPE slotted pipe was installed. Water in this pipe flows as shown on Figure 9-1 and discharges to the surface water ditch near the southwest corner of the cell.

9.3 Ship Creek Riprap Removal

Riprap on the bank of Ship Creek within the Site was initially installed by EPA contractors during removal activities in July 1986. The structure was repaired in 1997 with the addition of bedding fabric, bedding rock, and more riprap. The structure was intended to minimize the spread of contamination offsite during flooding. As such, it served its purpose well. However, it has been suggested that the presence of the riprap exacerbated bank erosion immediately downstream from the Site. Also, the riprap did not fit in with environmental planning measures underway by public agencies for restoration of the Ship Creek Corridor to a more natural condition. Therefore, removal of the riprap was determined to be the best course. This work was accomplished in May 1999. To minimize movement of sediment into the creek a temporary silt fence water barrier was placed in the creek.

9.4 Ship Creek Bank Restoration

Following removal of the riprap from Ship Creek (see above) it was necessary to restore the streambank to minimize future erosion. At the request of the Alaska Department of Fish & Game, the selected restoration techniques were bio-geotechnical in nature, and involved installation of materials and planting that will ultimately result in enhanced natural vegetation and erosion protection for the area. Figures 9-2 and 9-3 present plan and cross-section view of the work. Constructed features included:

- Excavation of a 2:1 slope in the bank underneath the area of removed riprap
- Creation of a base fill of dense sand and gravel, sloping into the bank about 6%
- Constructing a small trench for plantings outside the base fill and installing dormant Feltleaf Willow cuttings (3-4 feet long) in the basal trench – technique

known as live siltation

- Installation of a 12" diameter coir log along base of fill zone, outside the basal trench and cuttings
- Constructing two composite layers consisting of 18-inch-thick soil fill and a layer of live, dormant willow cuttings (soil wrapped in coir matting)

9.5 Topsoil Placement

Prior to hydroseeding and planting in the floodplain, topsoil was install in selected locations to expedite plant growth. Figure 9-4 presents the approximate areas of topsoil application. A total of about 675 tons of topsoil was installed.

9.6 Landscape Boulders

Riprap supplier also provided 25 granitic boulders weighing 5-7 tons each. These were placed in a staggered pattern in the floodplain below the erosion control wall. In the future, if Ship Creek floods through this area, the boulders will serve to break-up the current, creating turbulence and reducing the flow velocity. In the event the creek channel moves to this location at some time in the future, the boulders would serve as fish habitat and holding areas.

9.7 Hydroseeding

Approximately 3 acres of disturbed ground were hydroseeded on the consolidation cell sideslopes and floodplain area. In the floodplain area, a mixture native species consisting of Norcoast Bering Halgrass (80%) and Alyeska Polargrass (20%) was used. In the upland (cell sideslope) areas, a mixture of non-native seeds typically used for erosion control in Alaska was used.

9.8 Planting Trees And Shrubs

On the top-of-bank area adjacent or overlying the streambank restoration area, 150 woody or herbaceous shrubs were planted. In the remaining parts of the floodplain area, 50 trees and 100 shrubs were planted. This work was done prior to the hydroseeding.

9.9 Consolidation Cell Access Improvements

As originally designed, the ditch along the north side of the consolidation cell would have made vehicular access to the top of the cell very difficult due to its depth and the steepness of the ditch sides. The ditch was redesigned in the field in consultation with the Alaska Railroad and their tennant. The resulting ditch forms a gentle swale.

10.0

AIR MONITORING

Air quality at the perimeter of the project Site was monitored with a combination of real-time instruments, polyurethane filter (PUF), and high-volume (Hi-Vol) air samplers. This section presents a summary of the air monitoring results.

10.1 Air Quality Criteria

Table 10-1 was developed for the Air Monitoring Plan which was part of the RA Construction Work Plan (ALTA, 1998). Values in this table were used as the criteria for this project. The PEL and IDLH levels in the table are based on protection of workers. The NAAQS levels are ambient air criteria and are based on long-term protection of human health. Two concentrations were used for air quality levels; one for on-Site workers and one for the surrounding community. The following criteria for 8 hour averages were used for on-Site workers during the remedial action at the Site:

1. Total dust concentration less than 15 mg/m^3 .
2. Lead concentration less than 0.05 mg/m^3 (milligrams per cubic meter).
3. PCB concentration less than 0.5 mg/m^3 .
4. Portland cement concentration less than 15 mg/m^3 .

The criteria for the surrounding community was set lower than the permissible exposure levels for on-Site workers. The surrounding community is industrial in nature with no sensitive populations and no nearby residents. The following criteria were applied at the Site perimeter:

1. Total dust concentration less than 1.5 mg/m^3 .
2. Lead concentration less than 0.015 mg/m^3 .
3. PCB concentrations less than 0.15 mg/m^3 .

**Table 10-1
CRITERIA FOR AIRBORNE CONTAMINATION**

CONTAMINANT	OSHA PEL (1) mg/m³ (a)	IDLH (2) mg/m³	NAAQS (3) mg/m³
Lead.	0.05	100	0.0015 (d)
Chlorodiphenyl, 54% chlorine (PCB).	0.5	5	
Dust, inert or nuisance.	15 total 5 resp. (c)	NS (b)	0.15 (c)
Portland Cement	15 total 5 resp.	5,000	

(1) Occupational Safety and Health Act (OSHA) Permissible Exposure Limits (PELs) per 29 CFR 1910 Subpart Z and 29 CFR 1926 Subpart D.

(2) Immediately Dangerous to Life or Health (IDLH) per Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Public Health Service, Center of Disease Control, National Institute of Occupational Safety and Health (NIOSH), Washington, D.C., 1994.

(3) National Ambient Air Quality Standards.

(a) Milligrams per cubic meter (mg/m³).

(b) No Standard (NS).

(c) Respirable fraction (resp.), or less than 10 micron size particles (PM-10).

(d) Average over 3 months.

The criteria for dust is less than the criteria for cement and quicklime. Therefore, if the dust concentration met the criteria, then the cement and quicklime criteria were satisfied. Dust levels were measured relative to background (upwind) levels.

10.2 Action Levels

Action levels below the air quality criteria were established so that the Contractor and Engineer would have an early warning that the levels are nearing the criteria. The ratio of action levels to air quality criteria varies depending on the potential impact to human health and the time needed to implement controls. For the perimeter dust monitoring, the action level (and alarm level in the monitors) was 0.15 mg/m³, for total dust over a one hour time period, which is less than NAAQS level of 0.15 mg/m³, which is based on a 24 hour average for respirable dust (which is considered equal to the quantity of dust particles less than 10 microns in size, or PM-10).

For on-Site dust monitoring, the action levels was presented in the Contractor's Health and Safety Plan. Since the Contractor was responsible for the health and safety of his workers, he was be given the opportunity to establish action levels appropriate for his operations.

10.3 Data Ram Dust Monitoring

The RA Contractor performed real-time dust monitoring in the breathing zone of selected site workers, to determine appropriate respiratory protection for workers, and assure non-exceedence of the allowable criteria. No situations were reported where dust monitoring levels exceeded allowable levels. The Engineer also monitored perimeter dust levels during periods of earthwork activity. A Mini-Ram dust monitor was used. Observed values were recorded on the Engineer's Daily Log. In general, down-wind monitoring values at the perimeter were well below allowable criteria. On two occasions, short-term peak values were found to exceed the allowable 8-hour values when work was on-going immediately next to the perimeter. The RA Contractor was notified of these occurrences and immediately took steps to apply water to the work areas.

10.4 Hi-Vol And PUF Air Sampling and Testing

Hi-Vol and PUF samplers were operated on days earthwork was being performed and there was the potential for dust formation. This last qualification is added since there were extended periods of very wet ground conditions and little potential for creation of dust. Each sampler was turned on in the morning at the start of the work day, and run for approximately 24 hours during each sample period. The samplers were labeled with a unique sample number and the dates during which the filter paper was in the sampler. A typical Hi-Vol sample identification number is "HVST2117" which indicates the sample was collected from Hi-Vol Station No. 2, and had the unique sample number 117. PUF samples had a similar identification number, except that the HV designation in the number was replaced by PU. Hi-vol and PUF samples were co-located at four stations around the Site. Station ST-1 was on the north side, Station ST-2 was on the east side, Station ST-3 was on the south side, and Station ST-4 was on the west side of the Site. Stations ST-1 through ST-3 were on the perimeter fence at their respective locations and Station ST-4 was on top of a pile of riprap rock.

Lead and total dust results from the Hi-Vol samples are presented in Table 10-2 at the end of this section. In this table, the sample station number, sample number, date of sample, air flow rate, and sample duration are shown in the first five columns. Columns 6 and 7 list the mass of Lead and dust determined by the lab to be present on the filter. Column 8 and 9 are calculated by dividing the mass of Lead and dust (respectively) by the volume of air passed through the filter.

The Lead concentrations in air/dust (Column 8, Table 10-2) ranged from 0.000003 to 0.00001 mg/m³. These values are all less than the perimeter criteria for Lead (0.015 mg/m³ above background). Therefore, even without subtracting any background values for Lead, the criteria was not exceeded. The total dust concentrations in air/dust (Column 9, Table 10-2) ranged from 0.044 mg/m³ to 0.7 mg/m³. These values are all less than the perimeter criteria for total dust (1.5 mg/m³).

above background).

PCB results from the PUF samplers are presented in Table 10-3. PUF samples for PCBs in air Column 8, Table 10-3 ranged from 0.0000002 mg/m³ to 0.0001 mg/m³. Therefore, even without subtracting any background values for PCBs, all samples were less than the allowable perimeter criteria for PCBs (0.15 mg/m³).

10.5 Weather Station Records

Weather records were kept throughout the period during which monitoring was required. On the basis of an hourly average, air temperature, barometric pressure, wind direction, and wind velocity were recorded for each hour of each day. All records were collected from the weather station and stored as electronic files. They are available in the project records, should the need arise to perform evaluations of the monitoring data.

**Figure 10-2
HI-VOL AIR SAMPLING AND TESTING DATA SUMMARY**

Hi Vol Station	Sample Number	Date of Filter	QA Stp m3/min	Sample Time (min)	Mass/fil Lead ug	Mass /fil TD mg	mg/m3 Lead	mg/m3 Dust
#1	HVST1001	5/8-9/98	1.0754	1236	90	152	6.77E-05	1.14E-01
#2	HVST2002	5/8-9/98	1.40934	1464	27	119	1.31E-05	5.77E-02
#3	HVST3003	5/8-9/98	1.09238	1339.8	10	72.3	6.83E-06	4.94E-02
#4	HVST4004	5/8-9/98	1.698	1390.8	43	140	1.82E-05	5.93E-02
#1	HVST1010	5/11-12/98	1.08389	1419	29	149	1.89E-05	9.69E-02
#2	HVST2011	5/11-12/98	1.40934	1407	14	115	7.06E-06	5.80E-02
#3	HVST3012	5/11-12/98	1.09238	1407.6	10	89.6	6.50E-06	5.83E-02
#4	HVST4013	5/11-12/98	1.63291	1410	69	164	3.00E-05	7.12E-02
#1	HVST1038	5/21-22/98	1.07257	1409.4	13	210	8.60E-06	1.39E-01
#2	HVST2039	5/21-22/98	1.3584	1410	8.2	209	4.28E-06	1.09E-01
#3	HVST3040	5/21-22/98	1.08106	1419.6	5.4	101	3.52E-06	6.58E-02
#4	HVST4041	5/21-22/98	1.57914	1426.8	18	223	7.99E-06	9.90E-02
#1	HVST1046	5/26-27/98	1.0754	1429.8	29	119	1.89E-05	7.74E-02
#2	HVST2047	5/26-27/98	1.35557	1428.6	14	123	7.23E-06	6.35E-02
#3	HVST3048	5/26-27/98	1.08106	1440	6.6	74.3	4.24E-06	4.77E-02
#4	HVST4049	5/26-27/98	1.61876	1449.6	140	185	5.97E-05	7.88E-02
#1	HVST1078	6/3-4/98	1.07257	1429.8	23	130	1.50E-05	8.48E-02
#2	HVST2079	6/3-4/98	1.39236	1425.6	7.6	125	3.83E-06	6.30E-02
#3	HVST3080	6/3-4/98	1.08106	1429.98	0	86.3	0.00E+00	5.58E-02
#4	HVST4081	6/3-4/98	1.62725	1386	28	130	1.24E-05	5.76E-02
#1	HVST1086	6/8-9/98	1.06974	1441.8	20	155	1.30E-05	1.00E-01
#2	HVST2087	6/8-9/98	1.39519	1443.6	14	234	6.95E-06	1.16E-01
#3	HVST3088	6/8-9/98	1.0754	1434.6	38	1070	2.46E-05	6.94E-01

Figure 10-2
HI-VOL AIR SAMPLING AND TESTING DATA SUMMARY

Hi Vol Station	Sample Number	Date of Filter	QA Stp m3/min	Sample Time (min)	Mass/fil Lead ug	Mass /fil TD mg	mg/m3 Lead	mg/m3 Dust
#4	HVST4089	6/8-9/98	No data					
#1	HVST1102	6/22-23/98	1.06691	1429.2	15	137	9.84E-06	8.98E-02
#2	HVST2103	6/22-23/98	No data					
#3	HVST3104	6/22-23/98	1.07257	1435.8	4.5	120	2.92E-06	7.79E-02
#4	HVST4105	6/22-23/98	1.63008	1441.2	11	165	4.68E-06	7.02E-02
#1	HVST1090	6/16-17/98	1.06691	1441.8	26	233	1.69E-05	1.51E-01
#2	HVST2091	6/16-17/98	1.46594	1449.6	38	231	1.79E-05	1.09E-01
#3	HVST3092	6/16-17/98	1.0754	1455	21	230	1.34E-05	1.47E-01
#4	HVST4093	6/16-17/98	1.60744	1458.6	59	340	2.52E-05	1.45E-01
#1	HVST1116	6/31-7/1/98	1.06408	1411.8	29	299	1.93E-05	1.99E-01
#2	HVST2117	6/31-7/1/98	1.38387	1413.6	16	312	8.18E-06	1.59E-01
#3	HVST3118	6/31-7/1/98	1.07257	1416.6	10	130	6.58E-06	8.56E-02
#4	HVST4119	6/31-7/1/98	1.65555	1419	33	292	1.40E-05	1.24E-01
#1	HVST1128	7/9-10/98	1.06691	1416	2	114	1.32E-06	7.55E-02
#2	HVST2129	7/9-10/98	1.36123	1428	49	115	2.52E-05	5.92E-02
#4	HVST4131	7/9-10/98	1.61876	1413	25	240	1.09E-05	1.05E-01
#1	HVST1135	7/13-14/98	1.06691	1431	55	142	3.60E-05	9.30E-02
#2	HVST2136	7/13-14/98	1.34425	1434	95	118	4.93E-05	6.12E-02
#3	HVST3137	7/13-14/98	1.07257	1440	10	68.1	6.47E-06	4.41E-02
#4	HVST4138	7/13-14/98	1.58763	1443	33	155	1.44E-05	6.77E-02
#1	HVST1150	7/23-24/98	1.06125	1350.6	38	126	2.65E-05	8.79E-02
#2	HVST2151	7/23-24/98	1.37255	1344.6	4	122	2.17E-06	6.61E-02
#3	HVST3152	7/23-24/98	1.06974	1354.8	5.5	65.2	3.79E-06	4.50E-02

PAi, PBi = Pressure initial in inches of Hg

PAf, PBf = Pressure final in inches of Hg

QA, QB = Flow m3/min (not corrected for standard temperature and pressure)

QAstp, QBstp = Flow m3/min (correct for standard temperature and pressure)

Pam = Atmospheric pressure in inches of Hg

Tam + 273 = Atmospheric temperature in Kelvins

STP-CF = Correction factor for standard temperature and pressure

DtA, DtB = Sampling interval in hours

Figure 10-3
PUF AIR SAMPLING AND TESTING DATA SUMMARY

Puf Station	Sample Number	Date of Filter	QA Stp m3/min	Sample Time (min)	Mass/fil PCBs ug	Mass/fil PCBs mg	mg/m3 PCBs
#1	PUST1001	5/8-9/98	0.220870	1471.8	0.56	0.00056	1.72E-06
#2	PUST2002	5/8-9/98	0.209543	1416	0.16	0.00016	5.39E-07
#3	PUST3003	5/8-9/98	0.223702	1359.6	0.19	0.00019	6.25E-07
#4	PUST4004	5/8-9/98	0.223702	1408.8	0.66	0.00066	2.09E-06
#1	PUST1010	5/11-12/98	0.237860	1426.8	0.98	0.00098	2.89E-06
#2	PUST2011	5/11-12/98	0.229365	1404.6	0.8	0.0008	2.48E-06
#3	PUST3012	5/11-12/98	0.218038	1402.8	1.26	0.00126	4.12E-06
#4	PUST4013	5/11-12/98	0.215207	1404	7.4	0.0074	2.45E-05
#1	PUST1038	5/21-22/98	0.208411	1408.8	6.69	0.00669	2.28E-05
#2	PUST2039	5/21-22/98	0.223702	1410	1.99	0.00199	6.31E-06
#3	PUST3040	5/21-22/98	0.209543	1419.6	3.02	0.00302	1.02E-05
#4	PUST4041	5/21-22/98	0.212375	1425.6	6.08	0.00608	2.01E-05
#2	PUST2045	5/26-27/98	0.215207	1428.6	4.06	0.00406	1.32E-05
#3	PUST3046	5/26-27/98	0.201048	1440	5.48	0.00548	1.89E-05
#4	PUST4047	5/26-27/98	0.209543	1449.6	18.89	0.01889	6.22E-05
#1	PUST1063	6/3-4/98	0.207844	1429.8	5.9	0.0059	1.99E-05
#2	PUST2064	6/3-4/98	0.243523	1425.6	2.16	0.00216	6.22E-06
#3	PUST3065	6/3-4/98	0.212375	1429.98	8.1	0.0081	2.67E-05
#4	PUST4066	6/3-4/98	0.209543	1386	47.3	0.0473	0.000163
#1	PUST1071	6/8-9/98	0.207844	1441.8	9.34	0.00934	3.12E-05
#2	PUST2072	6/8-9/98	0.249187	1443.6	2.9	0.0029	8.06E-06
#3	PUST3073	6/8-9/98	0.206712	1434.6	3.28	0.00328	1.11E-05
#4	PUST4074	6/8-9/98	0.212375	1437.6	15.92	0.01592	5.21E-05
#1	PUST1102	6/22-23/98	0.210959	1429.2	3.84	0.00384	1.27E-05
#2	PUST2103	6/22-23/98	0.252018	1438.8	6.94	0.00694	1.91E-05
#3	PUST3104	6/22-23/98	0.215207	1435.8	6.98	0.00698	2.26E-05
#4	PUST4105	6/22-23/98	0.212375	1441.2	26.6	0.0266	8.69E-05
#1	PUST1090	6/16-17/98	0.205579	1441.8	9.81	0.00981	3.31E-05
#2	PUST2091	6/16-17/98	0.254850	1449.6	6.98	0.00698	1.89E-05
#3	PUST3092	6/16-17/98	0.223702	1455	8.55	0.00855	2.63E-05
#4	PUST4093	6/16-17/98	0.209543	1458.6	36.92	0.03692	0.000121
#1	PUST1114	7/9-10/98	0.202747	1416	4.94	0.00494	1.72E-05
#2	PUST2115	7/9-10/98	0.235028	1428	2.72	0.00272	8.1E-06
#4	PUST4117	7/9-10/98	0.212375	1413	13.99	0.01399	4.66E-05
#1	PUST1121	7/13-14/98	0.199633	1431	7.65	0.00765	2.68E-05
#2	PUST2122	7/13-14/98	0.209543	1434	3.92	0.00392	1.3E-05
#4	PUST4124	7/13-14/98	0.209543	1443	17.36	0.01736	5.74E-05
#1	PUST4135	7/23-24/98	0.201615	1350.6	8.05	0.00805	2.96E-05
#2	PUST4136	7/23-24/98	0.229365	1344.6	2.79	0.00279	9.05E-06
#3	PUST4137	7/23-24/98	0.215207	1354.8	7.39	0.00739	2.53E-05
#4	PUST4138	7/23-24/98	0.212375	1359.6	9.91	0.00991	3.43E-05

11.0 RECORD KEEPING

11.1 Daily Logs

Both the RA Contractor, Wilder Construction Company, and the Project Engineer, ALTA Geosciences, kept daily records of the construction. The contractor's logs recorded number of personnel and hours onsite, weather conditions, work locations and activities, subcontractors onsite, equipment in use, and any quality control issues. The engineer also kept logs of similar types of items, plus information relating to Site meetings, visitors, and observations of the contractor's work. Both types of logs are available in the project files.

11.2 Health & Safety Reports

Provisions regarding health and safety were set forth in Site Safety Plans for the soil and groundwater remediation work. The RA Contractor kept a daily log of safety meetings, levels of personnel protection required, and any relevant safety or emergency issues. The health and safety issues were consistently handled in a very professional manner by the contractor's personnel.

The following safety incidents were reported in the contractor's daily logs:

Date: June 23, 1998 – An employee, not wearing a respirator, was overcome with vapors released during soils excavation for the consolidation cell. Employee was taken to a hospital emergency room and released after examination. Doctor believed the initial surprise or respiratory reaction caused hyperventilation. Blood tests showed no high levels of any potential toxins. Employee returned to work on following day without further incident. Soil samples from the location were collected and tested for EPA 8270 compounds. Chlorobenzene compounds were found at concentrations from about 3 to 21 mg/kg but most other 8270 compounds were non-detect.

No other emergencies or personal injury accidents were reported in the contractor's logs, and no personnel exposures beyond those allowable are known to have occurred.

11.3 Final Material Inventory

All waste materials not incorporated into the consolidation cell were properly disposed of. See Appendix C for manifests and disposal certificates for TSCA regulated materials.

11.4 Sample Chain of Custody

All air monitoring, site investigation, and confirmation testing samples that left the Site were attached to a chain-of-custody form, identifying personnel handling the sample. One copy of these has been filed in the project records and another has been forwarded to EPA as part of a separate submittal for laboratory testing results.

12.0

DEVIATIONS FROM ORIGINAL DESIGN

Scheduled erosion control wall work – The design called for construction of the erosion control wall early in the construction period, perhaps as early as March 1998. Based on a different schedule proposed by the RA Contractor, this work was actually done in mid-Summer 1998, near the later stages of the construction. This change was made largely due to the severe space limitations for soil stockpiles on the Site and the need to complete soils remediation in areas impacted by the erosion control wall excavation, prior to starting work on the wall.

UXO Work – Section 2.2.1 of the RA Construction Work Plan set forth the guidelines for UXO work during the construction period. Essentially, these guidelines were proven to be appropriate and were followed. However, the amount of work required, the large number of UXO items found, and the diversity of UXO items far exceeded anything envisioned during the project design. Section 6.0 of this report summarizes the additional work caused by UXO items on the Site.

Storm drain re-routing and manholes – The design called for re-routing the pre-existing 24" CMP which ran along the eastern side of the Site, near Yakutat Street. The plan was to install 45-degree angle turns made of CMP material to make the turns. Based on Municipality of Anchorage review comments, the design was changed to incorporate a concrete manhole at the turning point, rather than use CMP sections.

Smear zone excavation, partially without sheet piling – The design called for use of sheet piling around the smear zone to facilitate dewatering during deep soils removal. Piling was placed around the eastern half of the smear zone excavation, where the excavation depth was up to 5 feet below the groundwater table. However, in the western half of the smear zone, the necessary excavation turned out to be only 2 feet below the groundwater table, so this zone was dewatered using sump pumps in a perimeter trench. This change saved time and money during the construction, which allowed the work to proceed on schedule.

Consolidation cell enlargement – The size of the consolidation cell was estimated during the design, based on available data from site investigation work. The plan was always to raise the finished grade within the cell if expansion of the cell was necessary due to removing more soil than anticipated in the design. In fact this was necessary, and the high, southern end of the cell was raised from a planned grade of Elevation 83 to approximately Elevation 89. No changes were made to the lateral limits of the consolidation cell, and the northern side was not raised. The consequence of this change was that cell side slopes were higher than originally planned and the surface area on the slopes was greater. This resulted in more surface area to be covered with topsoil and hydroseed.

Topsoil Thickness – The topsoil thickness on the sides of the consolidation cell was decreased from 12", as shown in the design, to 4". This was done because the geomembrane cover soil was found to be a better plant-growing medium than was anticipated before the material arrived onsite. The thickness of geomembrane cover soil on the sides was increased to compensate for this change.

Drainage ditch changes – Minor changes were made to the downstream ends of both surface drainage ditches (east and west sides). On the east side, the ditch was discharged to an existing 24" CMP culvert that had previously carried water from surface ditches farther north on Yakutat Street. This change took advantage of the existing pipe and minimized streambank disruption at the discharge point. On the west side, the ditch was carried farther south by about 75 feet than shown on the drawings, in order to connect to an existing natural swale. This change made a corresponding shortening of about 75 in the westerly direction of the ditch. On the north side, the ditch was modified into a gentle swale to allow easier vehicular access to the top of the cell.

Riprap geotextile bedding fabric change – The design called for sewing together adjacent pieces of geotextile bedding fabric, to minimize the potential for gaps in the fabric. At the contractor's request, the overlap between pieces was increased and sewing was eliminated. Based on careful observation of the fabric installation and placement of the bedding rock, this change was appropriate and did not result in the observed formation of any gaps.

Cylinder molds, third set stored onsite -- the RA Work Plan called for storing the third set of S/S soil cement test cylinders at an offsite location until such time as they were needed for testing. After discussions with the PRP Group authorized representative and EPA RPM, it was determined the third set would be placed in the onsite storage vault.

Change in water discharge requirements – Water discharge requirements with respect to PCBs. The original AWWU effluent water quality maximum concentration goal for PCBs was 0.001 mg/L. After initial testing indicated the treated water was exceeding this value, discussions were held with AWWU, EPA, and the treatment subcontractor, Alaska Pollution Control (APC). It was the position of APC that it was technically impractical to meet the initial specification and that a higher value was needed. AWWU and EPA agreed to increase the discharge limit to 0.02 mg/L PCBs. Subsequent testing indicated no exceedences of this value.

Creek riprap removal and final site restoration changes – In early 1999 a meeting was held between ALTA, EPA, and Alaska Fish & Game to discuss removal of riprap in Ship Creek (installed prior to the RA Construction). It was decided that the riprap should be removed, and specific bank restoration measures designed and implemented for the disturbed area. This work has been described in Section 9.0, Landscaping.

13.0 CONCLUSION

Between March and November 1998, the Standard Steel RD/RA PRP Group completed major portions of a Remedial Action Construction at the Standard Steel and Metals Salvage Yard Superfund Site in Anchorage, Alaska. Final Site restoration and drainage work was completed in May 1999. The goal of the work was to excavate and consolidate (without treatment) soils exceeding the following criteria:

- Lead concentrations greater than 500 mg/kg either in floodplain soils or soils located within 3 feet of the finished ground surface outside the consolidation cell
- PCB concentrations greater than 10 mg/kg and located deeper than 3 feet below finished grade of the remediated Site in non-floodplain, non-consolidation cell areas
- PCB concentrations greater than 1.0 mg/kg and located in the floodplain area or in non-consolidation cell areas within 3 feet of finished grade

The goal of the work was also to excavate, treat, and consolidate soil exceeding the following criteria:

- Lead in concentrations greater than 1000 mg/kg, regardless of location on the Site
- PCBs in concentrations greater than 50 mg/kg, regardless of location on the Site

After excavation, or excavation and treatment from throughout the Site, soil was placed in a consolidation cell in the central portion of the Site and capped with a geomembrane system and approximately three feet of cover soil. An erosion control wall built of heavy stone riprap was constructed along the southern side of the cell and wrapping up both sides. This structure is intended to protect the cell from potential flooding and erosion associated with Ship Creek.

Soils excavations were completed in 170 quadrants (40' x 40' area) or approximately 6.25 acres of area. Approximately 32,700 tons of soil was placed in the consolidation cell without treatment and an additional 22,272 tons of soil was treated and then consolidated in the cell. Within the 22,272 tons of treated soil, approximately 9,700 tons was treated with Maectite for lead stabilization prior to being treated with other soils. The treatment process involved stabilization/solidification with 8% flyash and 16% portland cement, mixing in a

pugmill, placement in the cell with compaction, and curing/hardening. Extensive amounts of wood, metal and other debris was present in the site soils and had to be consolidated along with the impacted soils. Included in the metallic debris were numerous military ordinance items (UXO items) that required special handling and evaluation prior to disposal. Some of these items were removed from the Site by U.S. Army ordinance disposal personnel.

A major subtask to the soils removal work was excavation of PCB oil and associated soil from a zone where the oil had migrated after improper disposal. Because much of this zone was below the groundwater table, the excavation zone had to be dewatered before soils removal using a sheet pile cofferdam and sump pumps. Water removed from the impacted zone contained PCBs and required treatment before testing and discharge from the Site. This deep area of soils removal was called the smear zone, because floating oil had been smeared over a zone several feet thick by fluctuating groundwater.

Investigative sampling and confirmation sampling involved collection and testing of 856 samples. Investigative sampling data was used in conjunction with data derived during earlier work to define the extent of contamination and the required soils removal zones. Following soils removal in each impacted quadrant, a randomly located confirmation sample was collected and tested for lead and PCBs (smear zone samples were tested for PCBs only). The data from this testing was evaluated to demonstrate that all quadrants on the Site had been properly remediated and now meet Remedial Action Criteria.

Following completion of all soils removal, treatment, and consolidation, the consolidation cell was capped using a layer of foam insulation, 40-mil XR-5 geomembrane, a geocomposite drainage layer, and 3 feet of cover soil. Sideslopes on the cell were covered with a shallow layer of topsoil, a layer of jute matting, and hydroseeded for erosion protection. Old riprap on the bank of Ship Creek was removed and biogeotechnical slope stabilization measures and plantings were installed to restore the floodplain area on the Site.

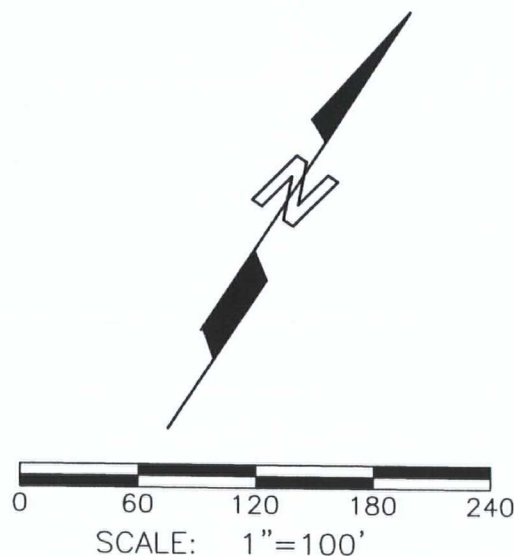
14.0

REFERENCES

- ALTA Geosciences, 1997, Design Level Treatability Study Work Plan, Standard Steel and Metals Salvage Yard, Anchorage, Alaska. January 1997.
- ALTA Geosciences, 1997, Design Level Treatability Study, Standard Steel and Metals Salvage Yard, Anchorage, Alaska. 1997.
- ALTA Geosciences, 1997, Work Plan Remedial Action Design/Remedial Action, Standard Steel and Metals Salvage Yard, Anchorage, Alaska. May 1997.
- ALTA Geosciences, January 1998, Project Manual, Remedial Action Construction, Standard Steel and Metals Salvage Yard, Anchorage, Alaska. January 1998.
- ALTA Geosciences, 1997, Work Plan Remedial Action Construction, Standard Steel and Metals Salvage Yard, Anchorage, Alaska (Final). April 1998.
- ALTA Geosciences, 1997, Conceptual Design Report, Standard Steel and Metals Salvage Yard, Anchorage, Alaska. 1997.
- ALTA Geosciences, 1997, Preliminary Design Report and Project Implementation Plans, Standard Steel and Metals Salvage Yard, Anchorage, Alaska. September 1997.
- Ecology and Environment (E&E), December 1988. On-Scene Coordinator's Report for Standard Steel and Metals Salvage Yard, Anchorage, Alaska.
- Gilbert, R.O., 1987. Statistical method for environmental pollution monitoring. Van Nostrand Reinhold Company, New York, NY. 320 pp.
- Schroeder, P. R., Dozier, T.S., Zappi, P. A., McEnroe, B. M., Sjostrom, J. W., and Peyton, R. L. (1994). The Hydrologic Evaluation of Landfill Performance (HELP) Model: Engineering Documentation for Version 3, EPA/600/R-94/168b, September 1994, U.S. Environmental Protection Agency Office of Research and Development, Washington, DC.
- Sharma, S., 1991. XSTABL v 4.10, Moscow, ID., Interactive Software Designs, Inc.
- University of Alaska (U of A), Arctic Environmental Information and Data Center. 1987 (actual date uncertain, this is the end of the included records). Climatological Summary For Period 1952-1987.
- University of Alaska Cooperative Agricultural Extension (U of A CAE). (Date Unknown). Growing Season: Days Above 45° F.

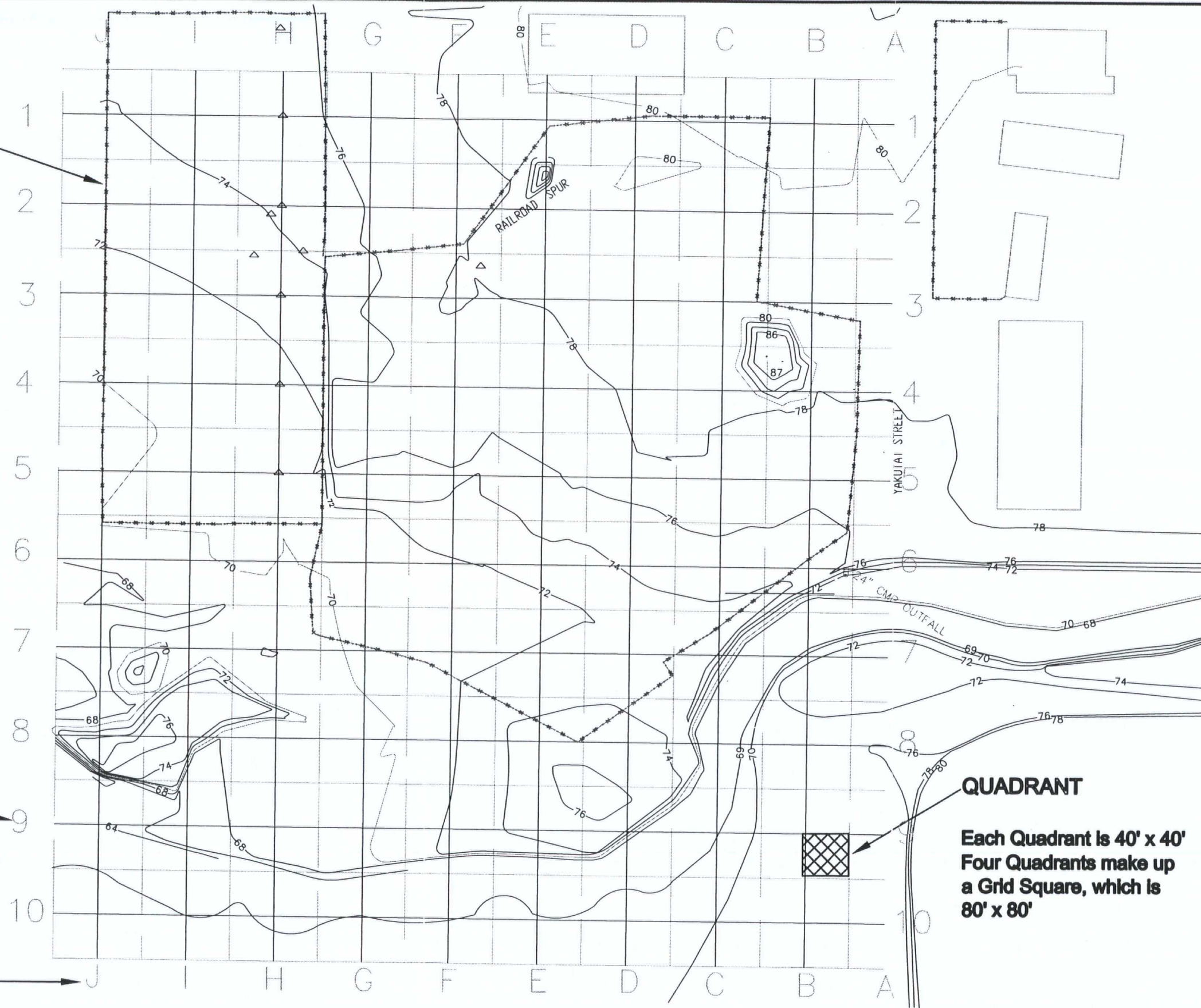
- University of Alaska Cooperative Extension Service, May 1991. A Revegetative Guide for Conservation Use in Alaska. 78p.
- U.S. Environmental Protection Agency (EPA), 1998. Standard Steel And Metals Salvage Yard Explanation Of Significant Differences, November 18, 1998.
- U.S. Environmental Protection Agency (EPA), 1997. Statement of Work, Remedial Design and Remedial Action, Standard Steel and Metals Salvage Yard, Anchorage, Alaska, August 25, 1998
- U.S. Environmental Protection Agency (EPA), 1996. Record of Decision, Standard Steel and Metals Salvage Yard Superfund Site, Anchorage, Alaska, US EPA Region X, Seattle, Washington, July 16, 1996.
- U.S. Environmental Protection Agency (EPA), 1994a. Baseline Human Health Risk Assessment Report, Standard Steel and Metals Salvage Yard, Anchorage, Alaska. Prepared by PRC Environmental Management, Inc.
- U.S. Environmental Protection Agency (EPA), 1989. Methods for evaluating the attainment of cleanup standards. – Volume 1: Soils and Solid media. EPA 230/02-89-042. U.S Environmental Protection Agency Office of Policy, Planning and Evaluation, Washington D.C.
- Woodward Clyde Consultants (WCC), 1997. Potentially Regulated Materials Removal Completion Report, Standard Steel and Metals Salvage Yard Superfund Site, Anchorage, AK.
- Woodward Clyde Consultants (WCC), 1996. Feasibility Study Report, Standard Steel and Metals Salvage Yard Superfund Site, Anchorage, AK.
- Woodward Clyde Consultants (WCC), 1994a. Remedial Investigation Report, Standard Steel and Metals Salvage Yard Superfund Site, Anchorage, AK.
- Woodward Clyde Consultants (WCC), 1994b. Soil Treatability Study Report, Standard Steel and Metals Salvage Yard Superfund Site, Anchorage, AK.

PRE-EXISTING EPA FENCE



SITE GRID ROWS

SITE GRID COLUMNS



QUADRANT

Each Quadrant is 40' x 40'
Four Quadrants make up
a Grid Square, which is
80' x 80'

ALTA GEOSCIENCES, INC.
Bothell, Washington

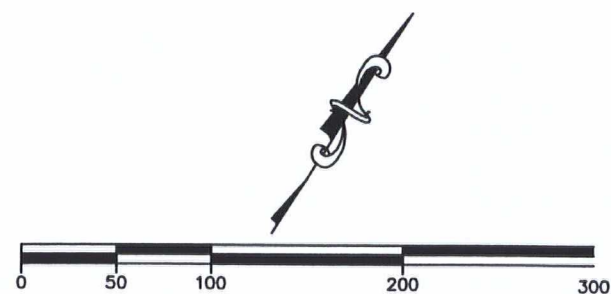
RA CONSTRUCTION COMPLETION REPORT
August 1999

**SITE GRID AND PRE-RA
TOPOGRAPHY**

**FIGURE
2-1**

STANDARD STEEL & METALS SALVAGE YARD

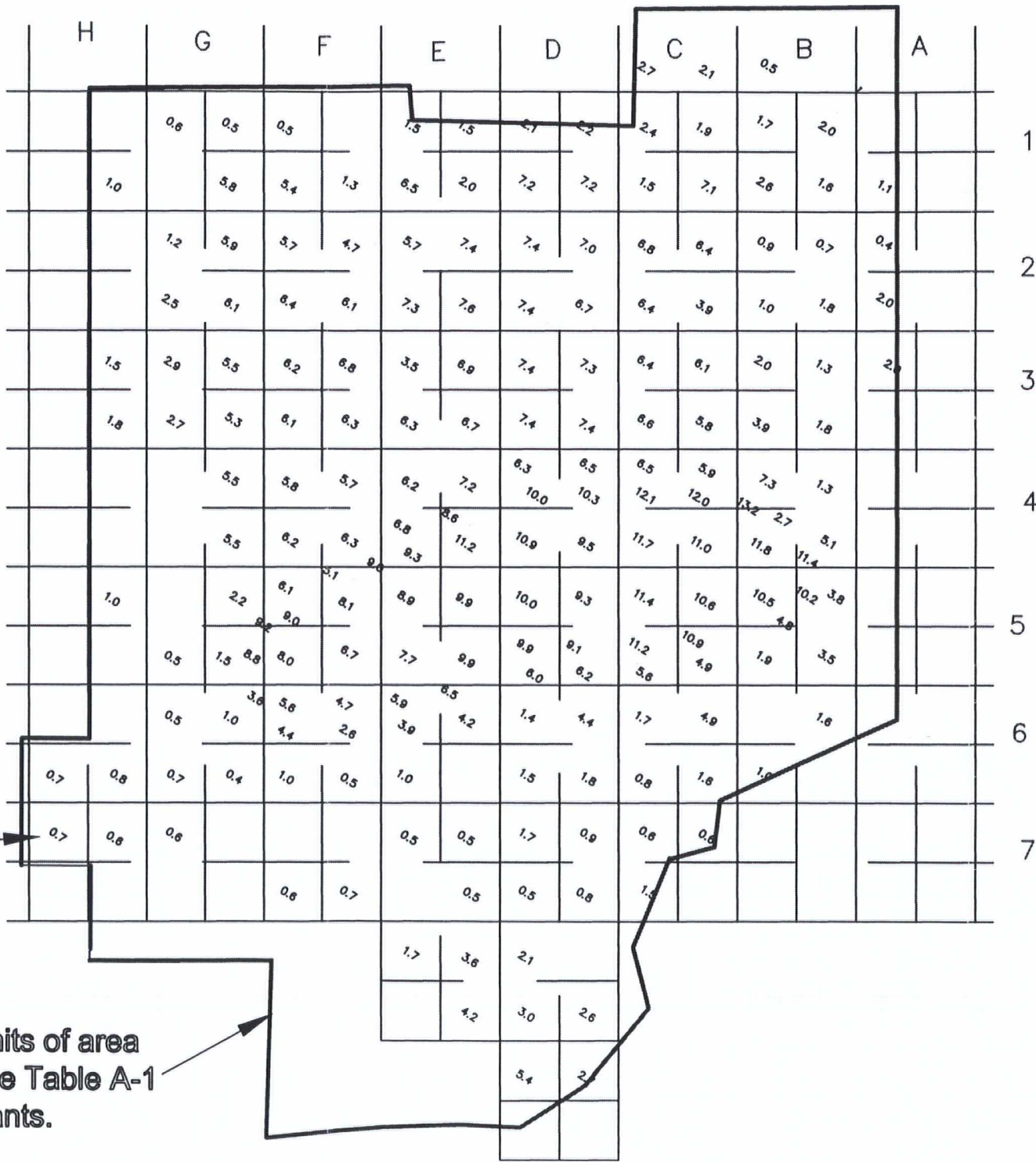
**Superfund Site
Anchorage, Alaska**

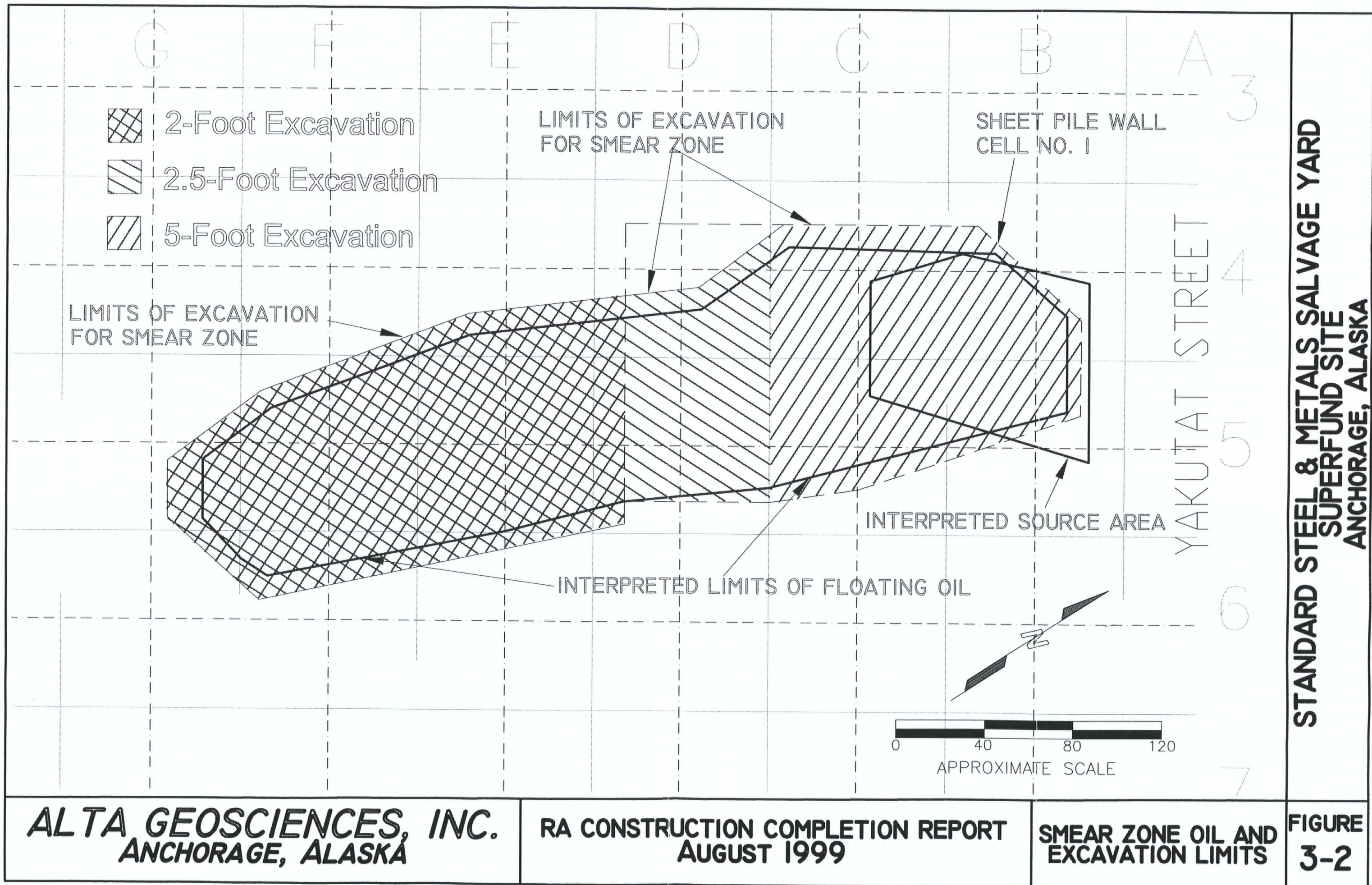


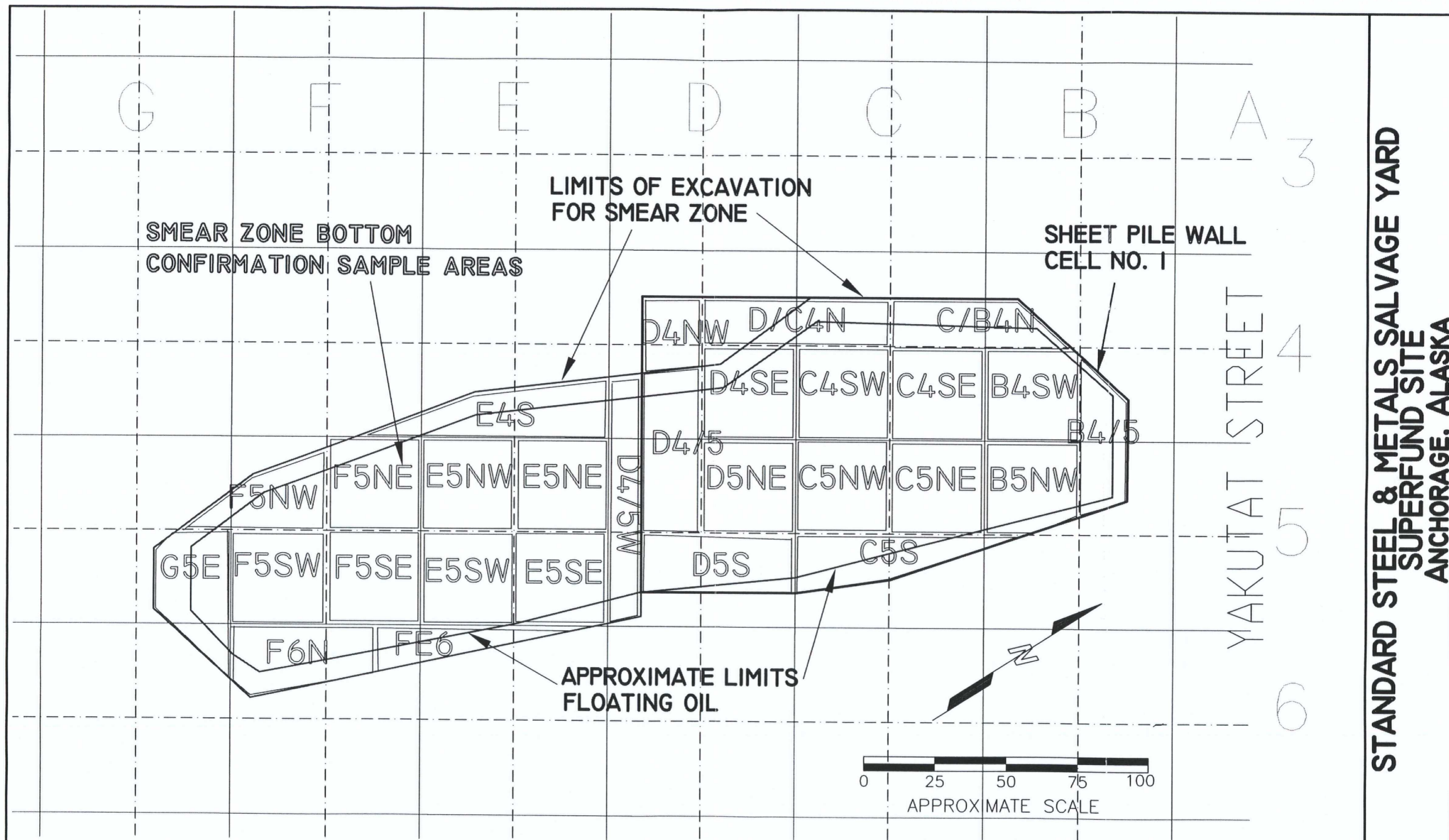
Approximate Scale (feet)

DEPTH OF EXCAVATION FROM ORIGINAL GROUND TO FINAL DEPTH (IN FEET)

Approximate limits of area remediated. See Table A-1 for list of quadrants.







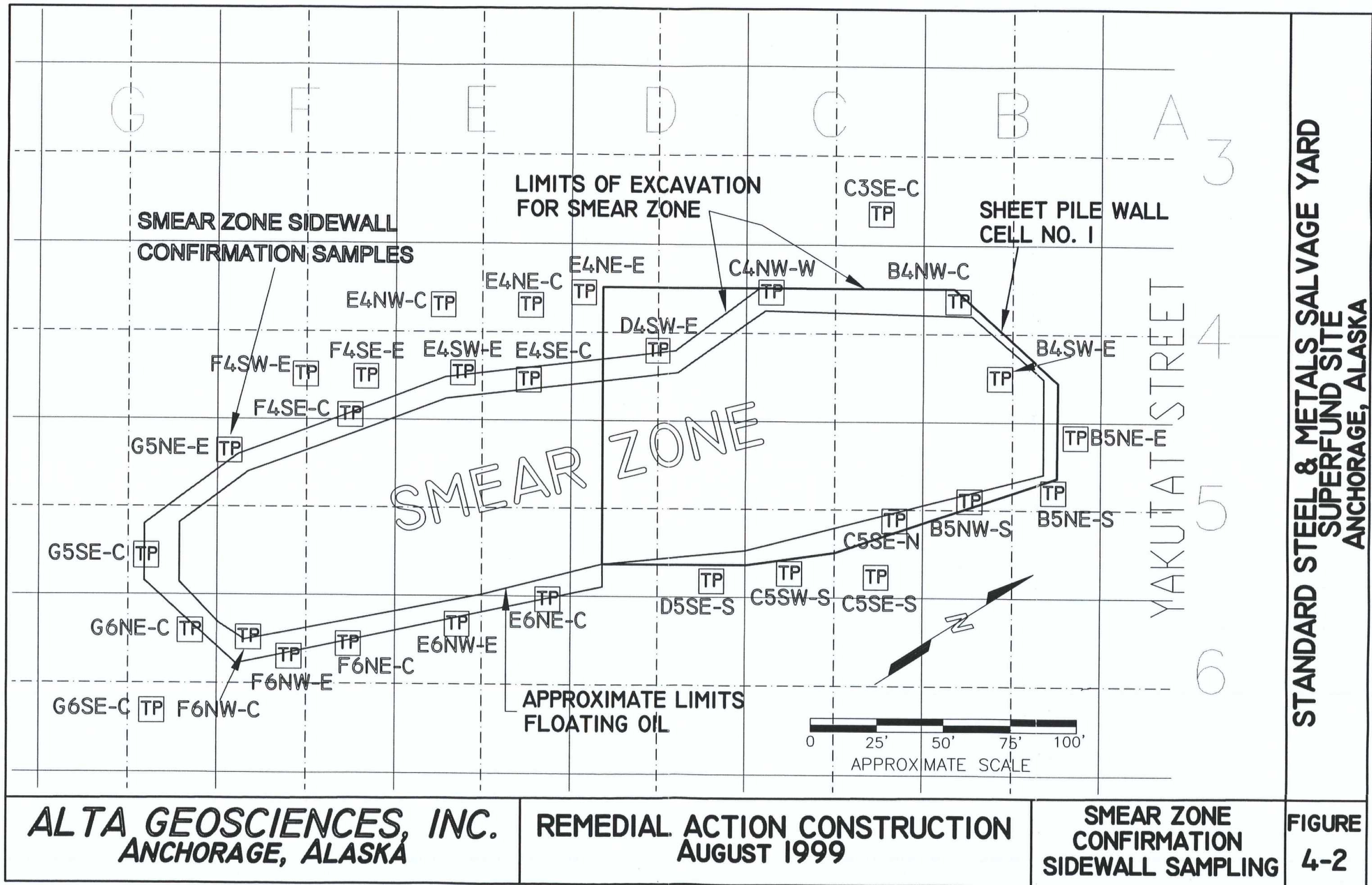
**STANDARD STEEL & METALS SALVAGE YARD
SUPERFUND SITE
ANCHORAGE, ALASKA**

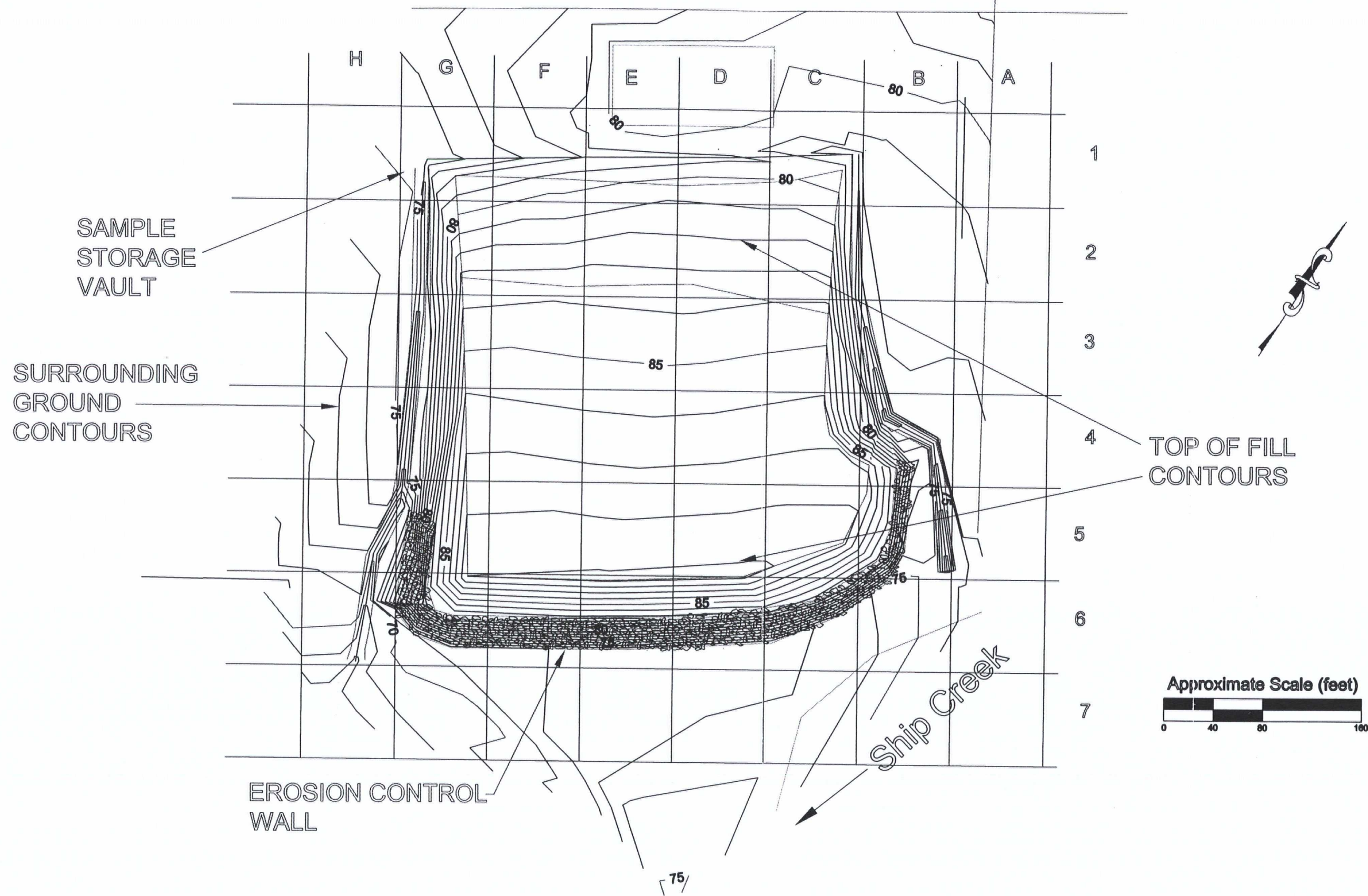
ALTA GEOSCIENCES, INC.
ANCHORAGE, ALASKA

REMEDIAL ACTION CONSTRUCTION
AUGUST 1999

**SMEAR ZONE
CONFIRMATION
BOTTOM SAMPLING**

**FIGURE
4-1**





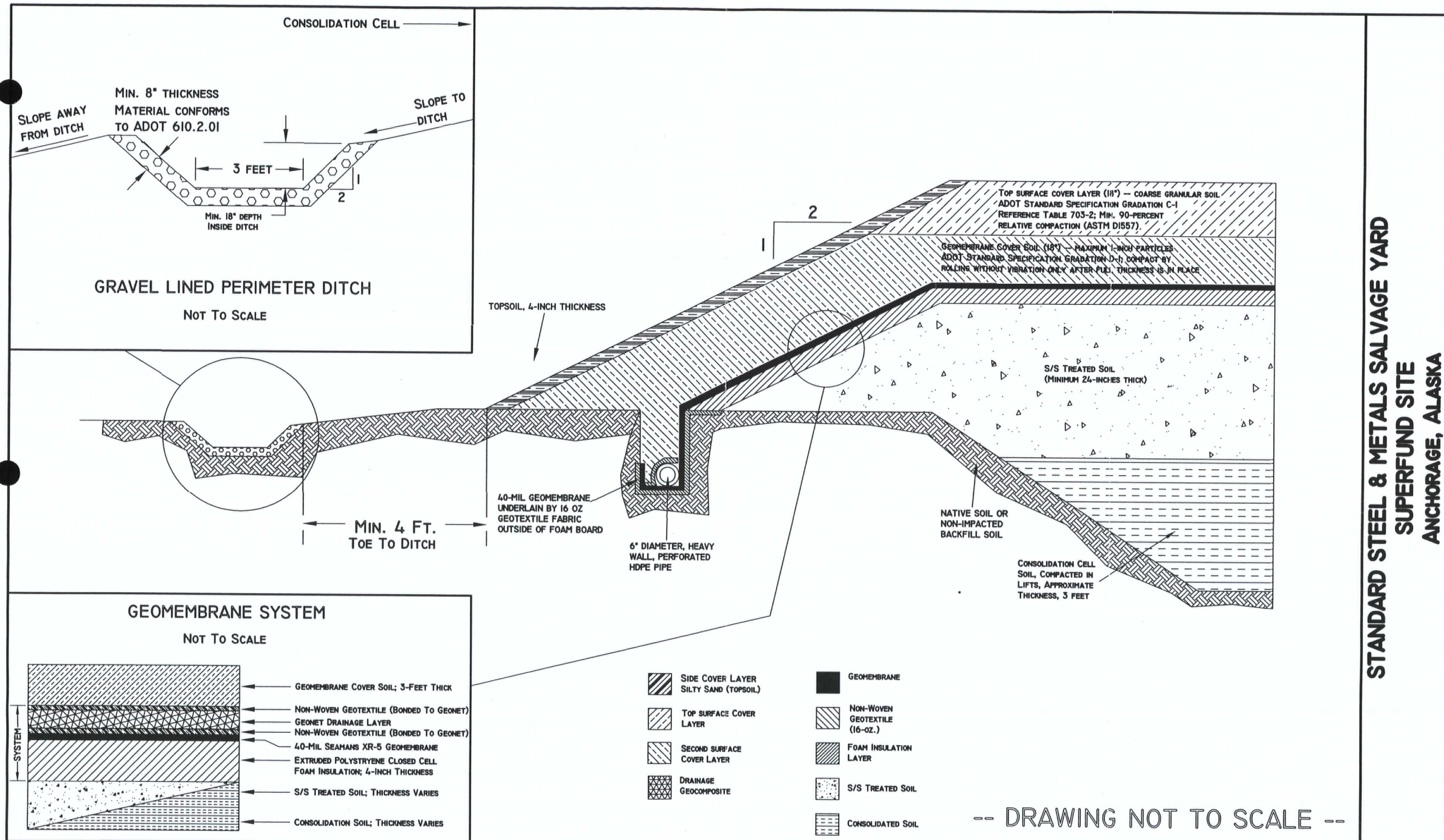
**STANDARD STEEL & METALS SALVAGE YARD
SUPERFUND SITE
ANCHORAGE, ALASKA**

ALTA GEOSCIENCES, INC.
BOTHELL, WASHINGTON

RA CONSTRUCTION COMPLETION REPORT
AUGUST 1999

**FINAL CONTOURS
CONSOLIDATION CELL**

**FIGURE
8-1**



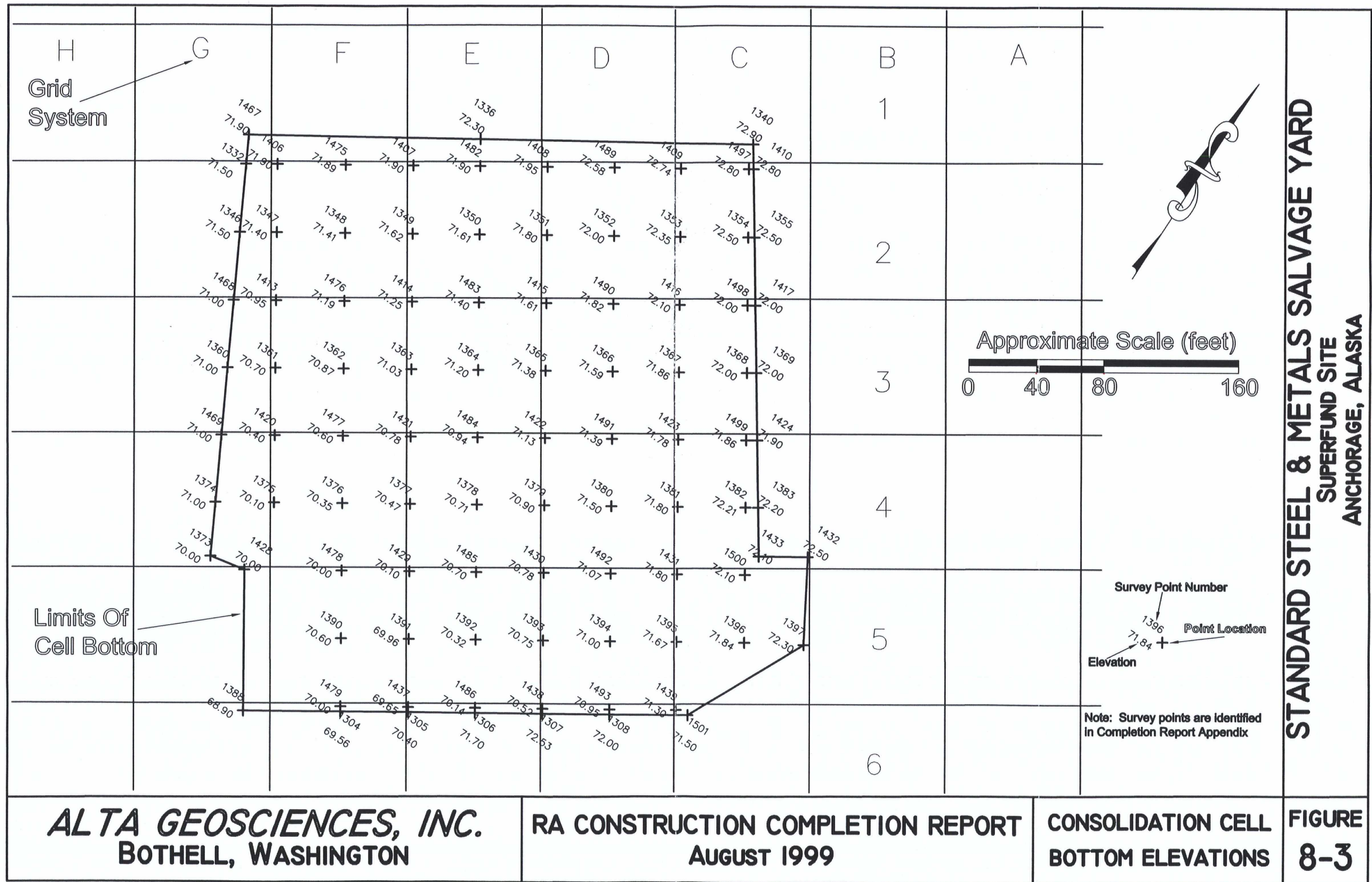
STANDARD STEEL & METALS SALVAGE YARD
SUPERFUND SITE
ANCHORAGE, ALASKA

ALTA GEOSCIENCES, INC.
ANCHORAGE, ALASKA

RA CONSTRUCTION COMPLETION REPORT
AUGUST 1999

CONSOLIDATION CELL
EDGE CROSS-SECTIONS

FIGURE
8-2



ALTA GEOSCIENCES, INC.

BOTHELL, WASHINGTON

RA CONSTRUCTION COMPLETION REPORT

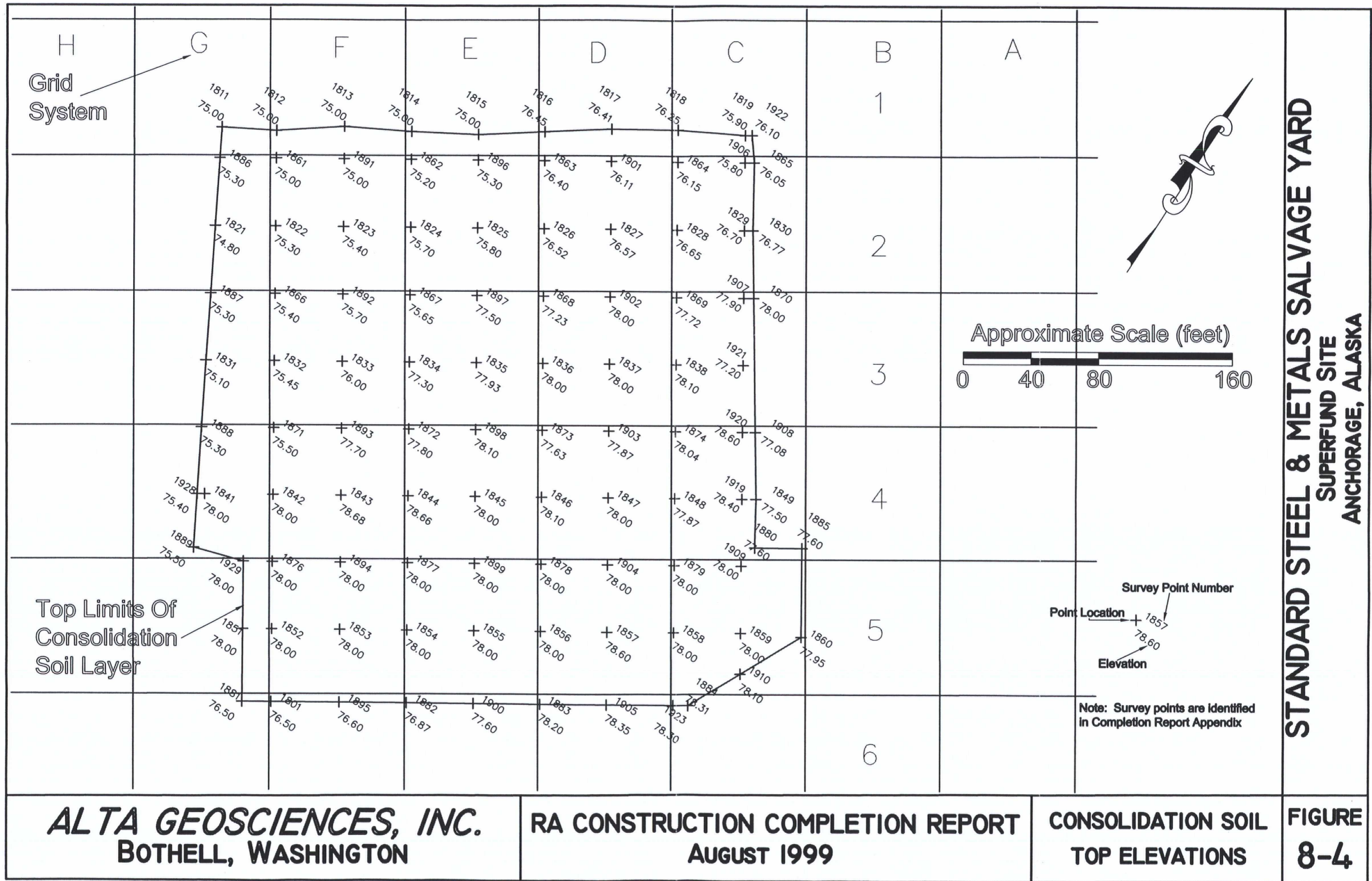
AUGUST 1999

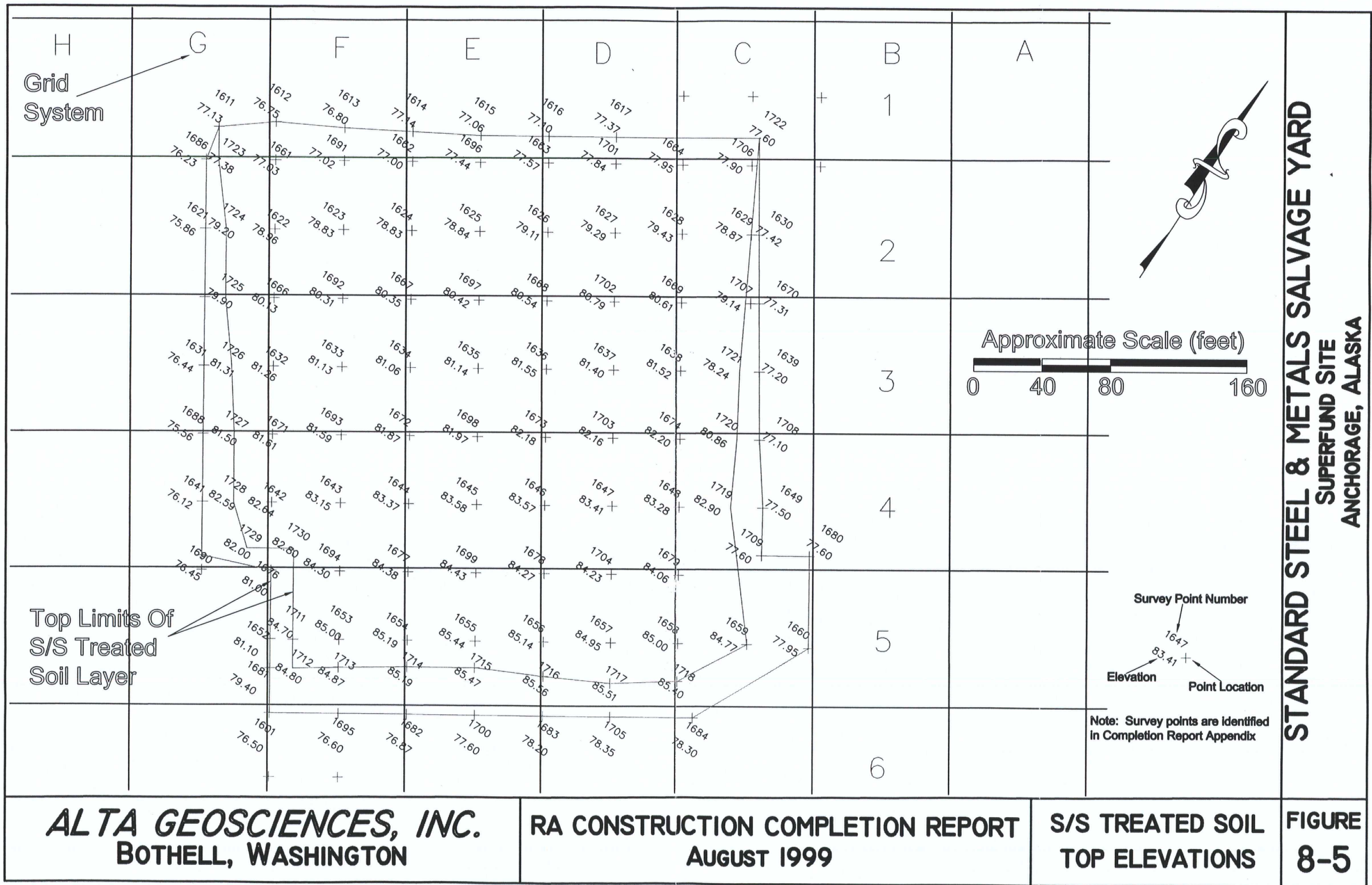
CONSOLIDATION CELL

BOTTOM ELEVATIONS

FIGURE

8-3



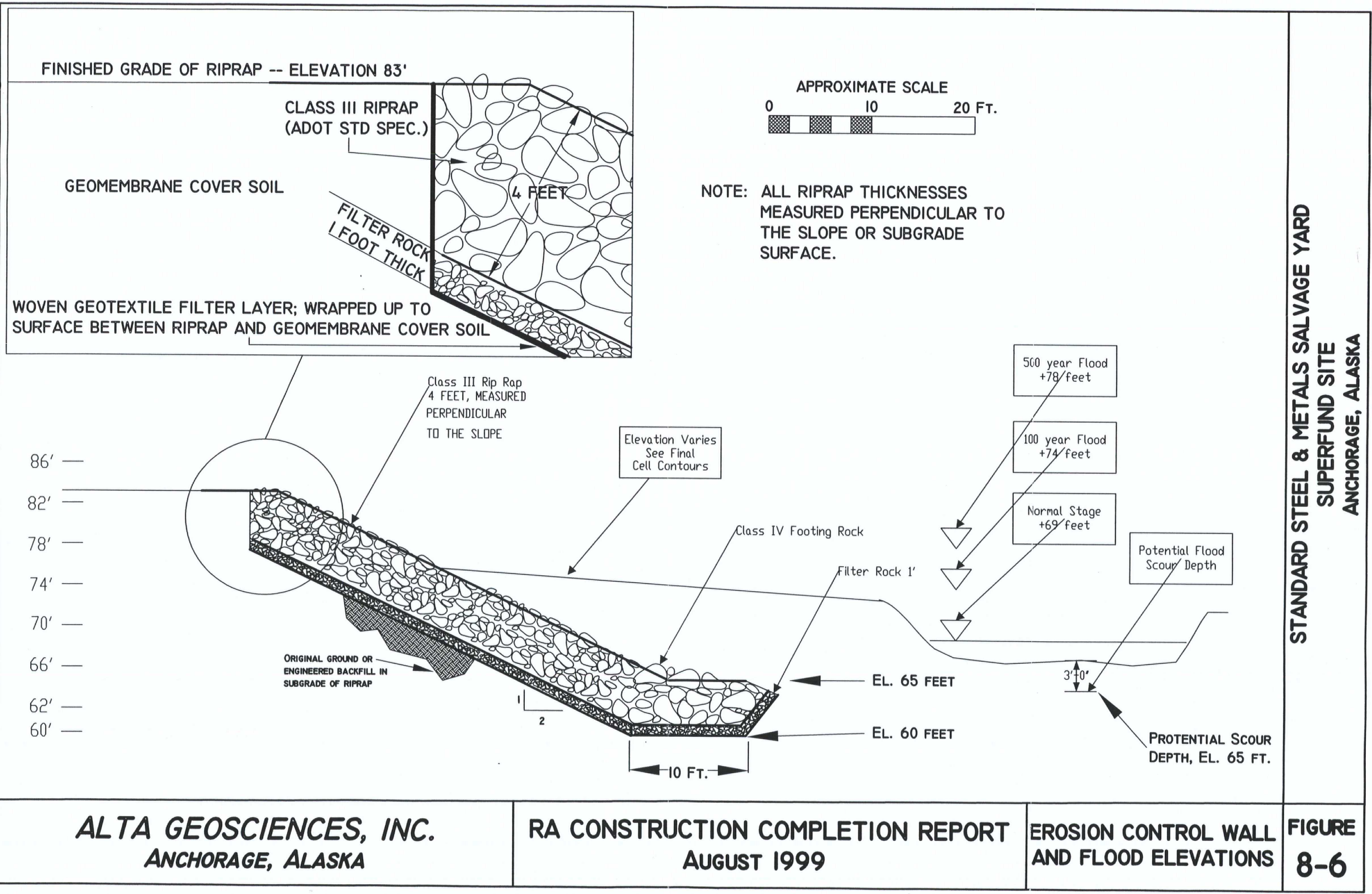


ALTA GEOSCIENCES, INC.
BOTHELL, WASHINGTON

RA CONSTRUCTION COMPLETION REPORT
AUGUST 1999

S/S TREATED SOIL
TOP ELEVATIONS

FIGURE
8-5



SUBSURFACE
6' HDPE
SLOTTED PIPE
FOLLOWS
GEOMEMBRANE
ANCHOR
TRENCH

OUTFALL ANCHOR TRENCH PIPE
INVERT ANCHOR TRENCH PIPE
2640759.69
529325.65
70.41
2640774.21
529347.13
70.50

Ditch discharges
to natural
drainage swale

PIPE DISCHARGE

CELL SURFACE RUNOFF AND
TOP OF GEOMEMBRANE FLOW

PIPE FLOW DIRECTION

INVERT OF PIPE CAP
BEGIN ANCHOR TRENCH PIPE
2640988.16
529618.64
81.00

BEGIN GEO-MEM ANCHOR TRENCH
2640989.00
529618.12

0 25 50 75 100
APPROXIMATE SCALE (FEET)

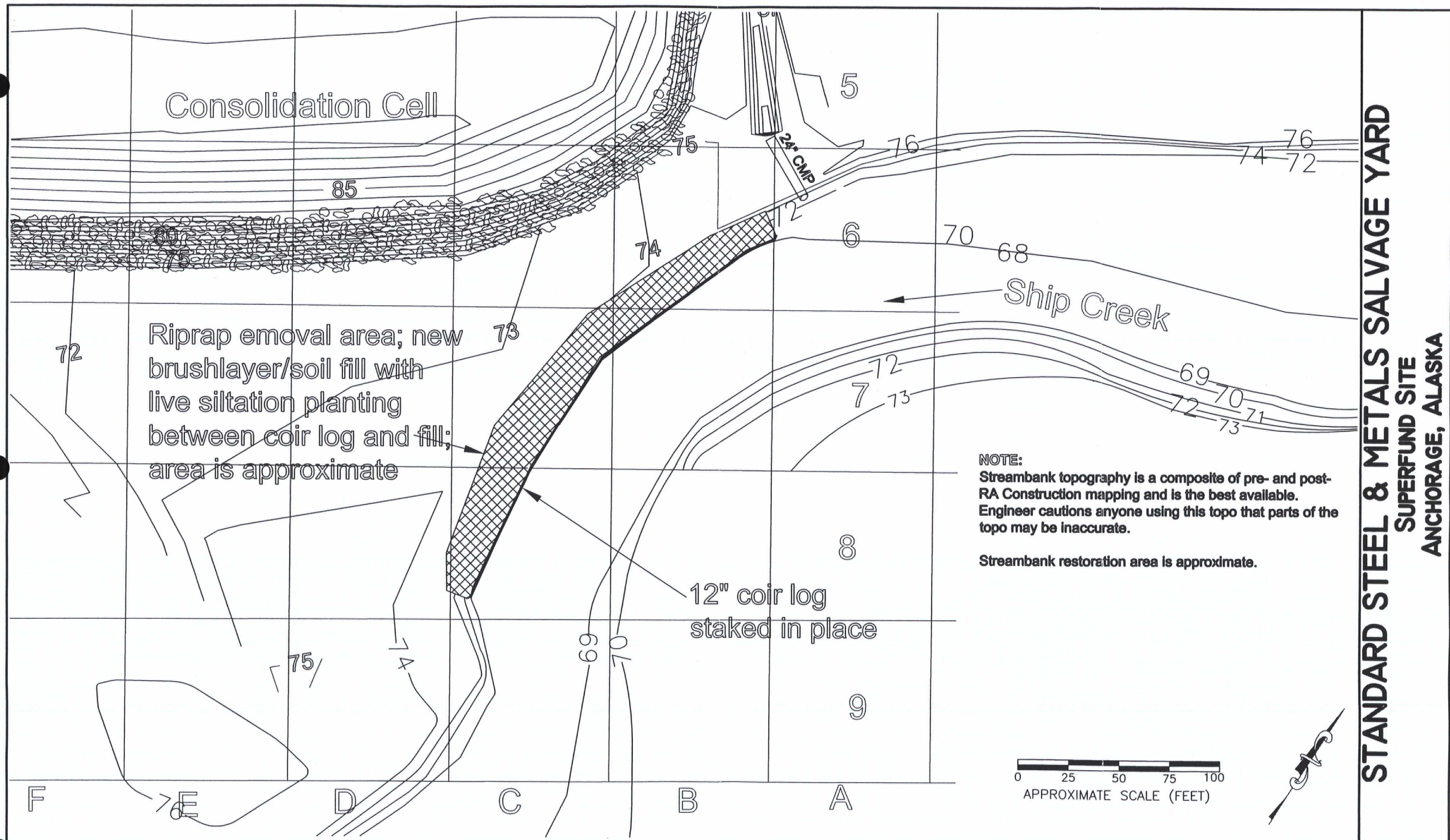
ALTA GEOSCIENCES, INC.
Bothell, Washington

RA CONSTRUCTION COMPLETION REPORT
August 1999

CELL DRAINAGE

FIGURE
9-1

STANDARD STEEL & METALS SALVAGE YARD
Superfund Site
Anchorage, Alaska



**STANDARD STEEL & METALS SALVAGE YARD
SUPERFUND SITE
ANCHORAGE, ALASKA**

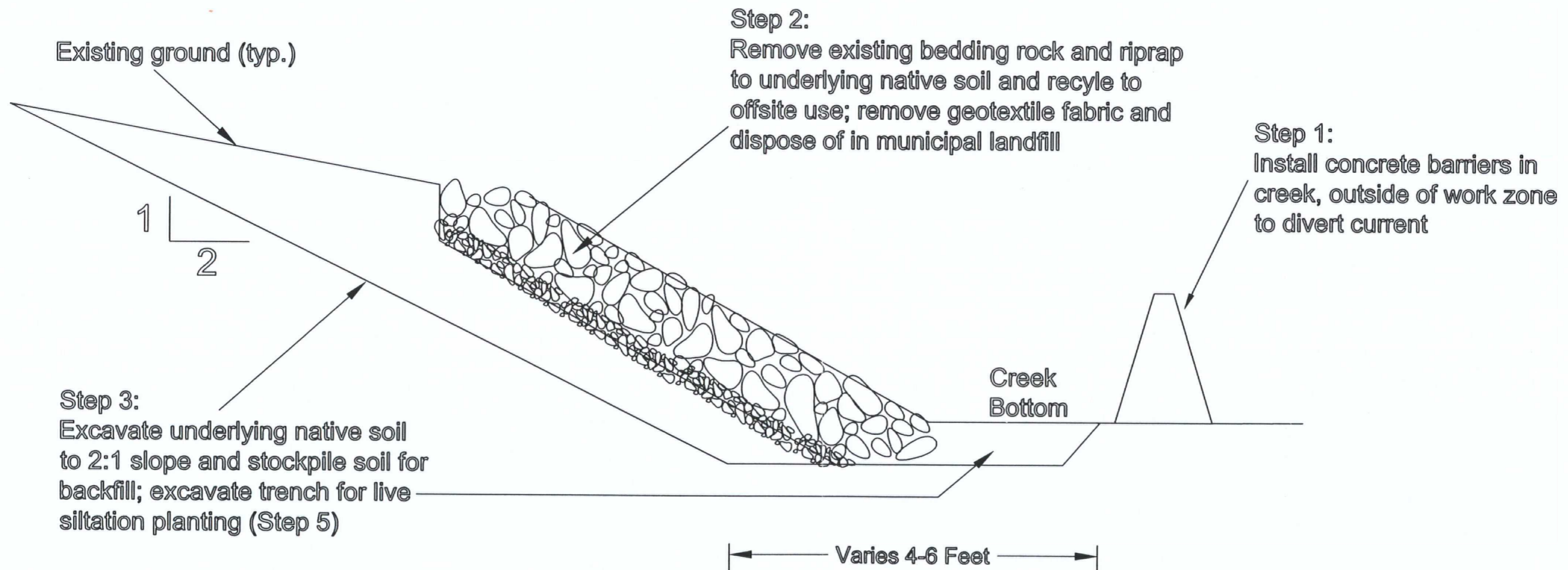
ALTA GEOSCIENCES, INC.
BOTHELL, WASHINGTON

**RA CONSTRUCTION COMPLETION REPORT
AUGUST 1999**

**SHIP CREEK BANK
RESTORATION PLAN**

**FIGURE
9-2**

SUMMARY OF WORK COMPLETED



STANDARD STEEL & METALS SALVAGE YARD
SUPERFUND SITE
ANCHORAGE, ALASKA

ALTA GEOSCIENCES, INC.
BOTHELL, WASHINGTON

RA CONSTRUCTION COMPLETION REPORT
AUGUST 1999

OLD RIPRAP REMOVAL
& BANK EXCAVATION

FIGURE
9-3A

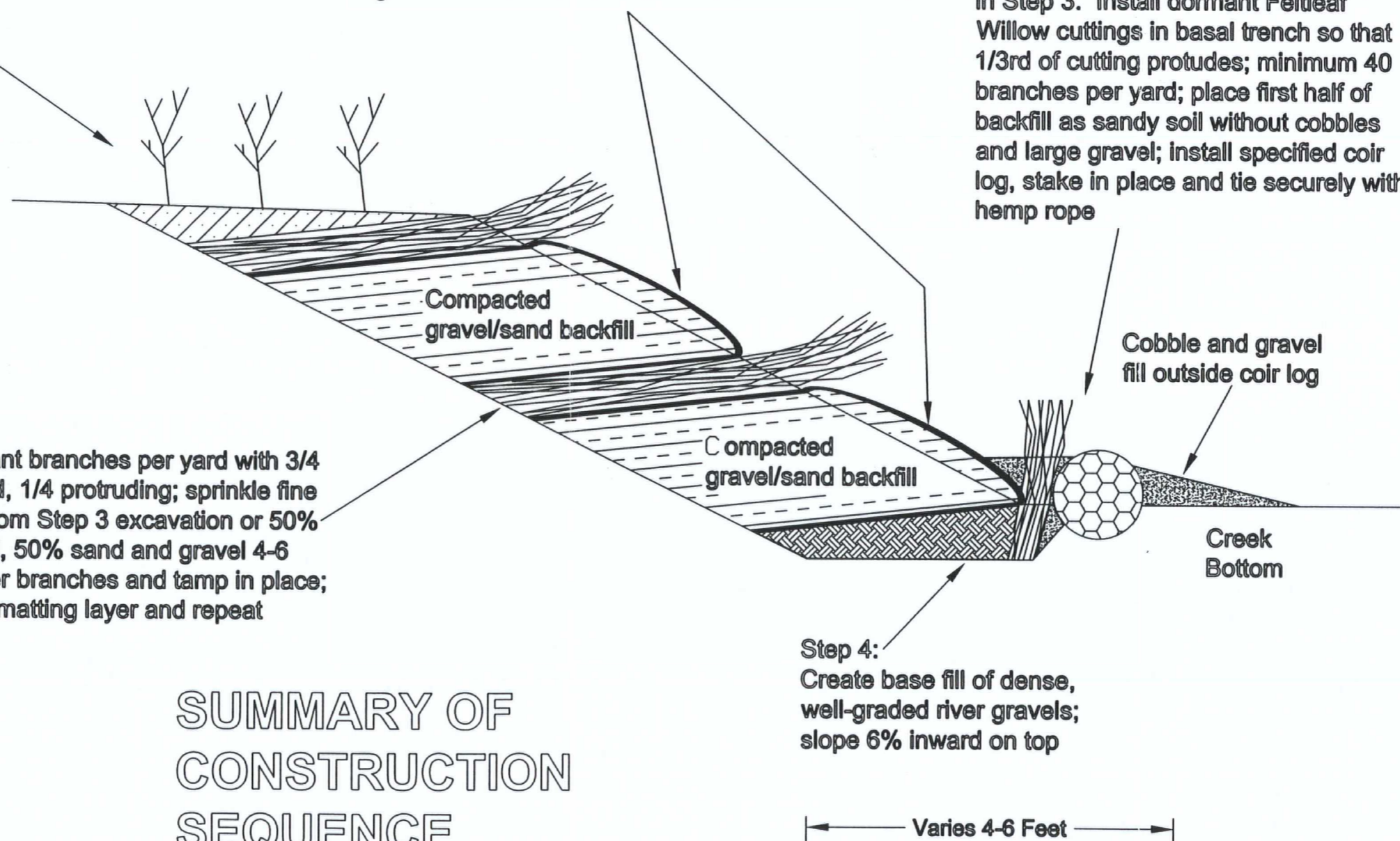
Step 8:
Place topsoil or silty sand from Step 3 on top of construction area as directed by Engineer; provide and install rooted woody and herbaceous plants as specified. Hand broadcast native grass seed onto bare soil exposed at the face of each brushlayer.

Step 6:
Install coir matting on top of base fill, staking in place and extending 5-6 feet beyond backfill face; construct compacted 18" thick backfill layer with 2:1 face and 6% backslope; wrap coir matting over face and top of fill, staking or stapling in place; finish backfill started in Step 5 with medium-large gravel around Feltleaf Willow cuttings and coir log

Step 5:
Excavate basal trench if not completed in Step 3. Install dormant Feltleaf Willow cuttings in basal trench so that 1/3rd of cutting protrudes; minimum 40 branches per yard; place first half of backfill as sandy soil without cobbles and large gravel; install specified coir log, stake in place and tie securely with hemp rope

Step 7:
Install 25 dormant branches per yard with 3/4 of branch buried, 1/4 protruding; sprinkle fine silty sand soil from Step 3 excavation or 50% imported topsoil, 50% sand and gravel 4-6 inches thick over branches and tamp in place; install next coir matting layer and repeat sequence

SUMMARY OF CONSTRUCTION SEQUENCE



Step 4:
Create base fill of dense, well-graded river gravels; slope 6% inward on top

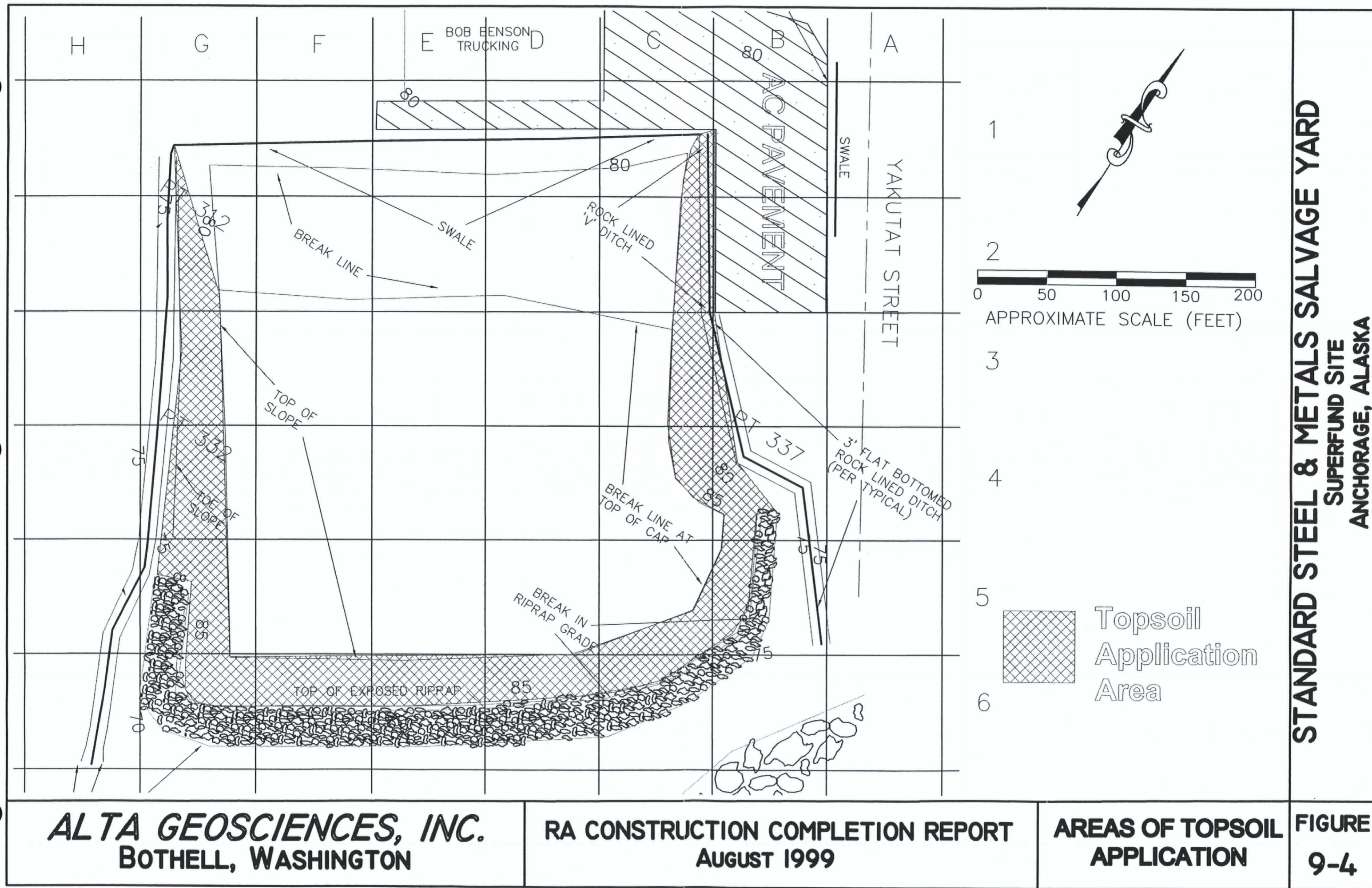
ALTA GEOSCIENCES, INC.
BOTHELL, WASHINGTON

1999 RA CONSTRUCTION WORK
AUGUST 1999

BANK RESTORATION
CROSS-SECTION

FIGURE
9-3B

STANDARD STEEL & METALS SALVAGE YARD
SUPERFUND SITE
ANCHORAGE, ALASKA



ALTA GEOSCIENCES, INC.
BOTHELL, WASHINGTON

RA CONSTRUCTION COMPLETION REPORT
AUGUST 1999

AREAS OF TOPSOIL APPLICATION

FIGURE 9-4

**APPENDIX A
CONFIRMATION SAMPLE RESULTS**

**APPENDIX A
CONFIRMATION SAMPLING RESULTS**

Table A-1 SURFACE REMEDIATION CONFIRMATION SAMPLE RESULTS						
QUADRANT	DATE** EXCAVATED	DATE SAMPLED	SAMPLE SEQUENCE NUMBER	LEAD RESULT (mg/Kg)	PCBs RESULT (mg/Kg)	NOTES
A1NW	CS	25-Jul-98	1025	10.6	0.16	DONE
A1SW	15-Aug-98	03-Aug-98	1084	138	1.33	DONE
A2NW	15-Aug-98	03-Aug-98	1085	4.69	<0.6	DONE
A2SW	15-Aug-98	10-Aug-98	1117	140	1.27	DONE
A3NW	15-Aug-98	10-Aug-98	1121	159	1.35	DONE
A3SW	CS	25-Jul-98	1030	28.3	0.438	DONE
A4NW	CS	25-Jul-98	1031	64.4	0.357	DONE
A4SW	CS	25-Jul-98	1032	40.1	0.712	DONE
A5NW	CS	25-Jul-98	1033	20	0.316	DONE
A5SW	CS	25-Jul-98	1034	24.2	0.223	DONE
A6NW	CS	25-Jul-98	1035	43.9	0.874	DONE
B0SW	13-May-98	13-May-98	537	10	0.676	DONE
B1NE	15-May-98	15-May-98	561	8.48	0.181	DONE
B1NW	15-May-98	15-May-98	560	5.91	<0.4	DONE
B1SE	15-May-98	15-May-98	562	7.87	0.363	DONE
B1SW	15-May-98	15-May-98	565	5.95	<0.4	DONE
B2NE	11-May-98	11-May-98	519	<10	<0.4	DONE
B2NW	07-May-98	07-May-98	497	15.4	0.404	DONE
B2SE	15-May-98	15-May-98	564	4.8	<0.4	DONE
B2SW	15-May-98	15-May-98	566	5.02	0.09	DONE
B3NE	15-May-98	15-May-98	567	104	<0.4	DONE
B3NW	13-May-98	13-May-98	531	19.5	0.132	DONE
B3SE	12-May-98	12-May-98	528	26.5	<0.4	DONE
B3SW	19-Aug-98	19-Aug-98	1146	5.74	<0.6	DONE
B4NE	25-Jun-98	25-Jun-98	847	126	0.319	DONE
B4NW	13-Jun-98	13-Jun-98	798	25.2	0.705	DONE
B4SE	11-Jun-98	11-Jun-98	794	6.8	<0.6	DONE
B4SW	11-Jun-98	11-Jun-98	795	10.7	0.462	DONE
B5NE	24-Jun-98	24-Jun-98	843	9.15	<0.6	DONE
B5NW	24-Jun-98	24-Jun-98	820	647	15300	FINISHED IN SMEAR ZONE
B5SE	24-Jun-98	24-Jun-98	845	12.8	0.752	DONE
B5SW	24-Jun-98	24-Jun-98	846	11.3	1.49	UNDER COVER
B6NE	24-Jun-98	24-Jun-98	841	37.6	<0.6	DONE
B6NW	CS	11-May-98	513	<10	0.308	DONE
B6SE		NA	IN CREEK			IN CREEK
B6SW	CS	05-Jun-98	749	15.6	<0.6	DONE
B7NW		NA	IN CREEK			IN CREEK

Table A-1
SURFACE REMEDIATION
CONFIRMATION SAMPLE RESULTS

QUADRANT	DATE** EXCAVATED	DATE SAMPLED	SAMPLE SEQUENCE NUMBER	LEAD RESULT (mg/Kg)	PCBs RESULT (mg/Kg)	NOTES
C0SE	05-Jun-98	05-Jun-98	748	<10	0.636	DONE
C0SW	09-Jun-98	09-Jun-98	767	9.85	<0.6	DONE
C1NE	30-May-98	30-May-98	672	6.89	0.217	DONE
C1NW	08-May-98	09-May-98	504	<10	<0.4	DONE
C1SE	29-May-98	29-May-98	662	10.8	<0.6	DONE
C1SW	08-May-98	09-May-98	505	<10	0.407	DONE
C2NE	09-Jun-98	09-Jun-98	775	15.5	0.223	DONE
C2NW	09-Jun-98	09-Jun-98	774	105	0.431	DONE
C2SE	09-Jun-98	09-Jun-98	776	5.98	0.114	DONE
C2SW	09-Jun-98	09-Jun-98	777	5.37	<0.6	DONE
C3NE	09-Jun-98	09-Jun-98	779	148	0.758	DONE
C3NW	09-Jun-98	09-Jun-98	778	13.6	<0.6	DONE
C3SE	25-Jun-98	29-Jun-98	872	23.2	2.68	DONE
C3SW	23-Jun-98	23-Jun-98	840	49	1.04	DONE
C4NE	17-Jun-98	17-Jun-98	808	178	26.8	FINISHED IN SMEAR ZONE
C4NW	29-May-98	29-May-98	659	26.5	1.85	FINISHED IN SMEAR ZONE
C4SE	03-Jun-98	03-Jun-98	739	6.81	2.72	CONSOL. IN CELL
C4SW	30-May-98	30-May-98	670	28.7	3.49	CONSOL. IN CELL
C5NE	26-May-98	04-Jun-98	743	8.15	0.373	DONE
C5NW	26-May-98	26-May-98	636	40.8	1.23	CONSOL. IN CELL
C5SE	27-May-98	27-May-98	643	23.7	0.975	DONE
C5SW	27-May-98	27-May-98	644	10.1	<0.6	DONE
C6NE	07-May-98	07-May-98	489	13.4	1.95	UNDER CELL COVER
C6NW	08-May-98	09-May-98	508	<10	<0.4	DONE
C6SE	10-Jul-98	10-Jul-98	945	6.54	<0.6	DONE
C6SW	05-May-98	06-May-98	485	86.9	0.646	DONE
C7NE	CS	15-Jul	979	54.9	0.731	DONE
C7NW	CS	15-Jul	977	15.9	0.22	DONE
C7SE		NA	IN CREEK			
C7SW	15-Aug-98	15-Aug-98	1140	7.71	<0.6	DONE
C8NW		NA	IN CREEK			IN CREEK
C8SW		NA	IN CREEK			IN CREEK
D1NE	09-Jun-98	09-Jun-98	772	4.94	0.355	DONE
D1NW	09-Jun-98	09-Jun-98	773	4.92	<0.6	DONE
D1SE	14-May-98	14-May-98	553	253	0.221	DONE
D1SW	14-May-98	14-May-98	552	7.78	<0.4	DONE
D2NE	14-May-98	19-May-98	623	35.8	0.318	DONE
D2NW	15-Jun-98	15-Jun-98	805	4.36	1.62	DONE
D2SE	17-Jun-98	17-Jun-98	811	39.6	0.333	DONE
D2SW	17-Jun-98	17-Jun-98	810	4.12	0.248	DONE

Table A-1
SURFACE REMEDIATION
CONFIRMATION SAMPLE RESULTS

QUADRANT	DATE** EXCAVATED	DATE SAMPLED	SAMPLE SEQUENCE NUMBER	LEAD RESULT (mg/Kg)	PCBs RESULT (mg/Kg)	NOTES
D3NE	09-Jun-98	09-Jun-98	769	5.44	<0.6	DONE AT SURFACE
D3NW	29-Jun-98	29-Jun-98	882	<5	<0.6	DONE
D3SE	10-Jun-98	11-Jun-98	792	7.87	<0.6	DONE
D3SW	10-Jun-98	17-Jun-98	807	6.53	0.15	DONE
D4NE	29-May-98	29-May-98	660	7.36	0.428	DONE
D4NW	11-Jun-98	11-Jun-98	789	6.22	<0.6	DONE
D4SE	27-May-98	27-May-98	642	13.3	<0.6	DONE
D4SW	28-May-98	28-May-98	652	8.31	<0.6	DONE
D5NE	26-May-98	26-May-98	637	24.5	0.618	DONE
D5NW	11-May-98	09-May-98	511	39.9	1.64	CONSOL. IN CELL
D5SE	08-May-98	09-May-98	509	<10	<0.4	DONE
D5SW	11-May-98	09-May-98	510	<10	<0.4	DONE
D6NE	07-May-98	07-May-98	488	<10	<0.4	DONE
D6NW	28-May-98	28-May-98	651	108	2.66	UNDER CELL COVER
D6SE	04-May-98	06-May-98	484	18.8	1.01	DONE
D6SW	04-May-98	06-May-98	483	549	1.61	UNDER CELL COVER
D7NE	CS	15-Jul-98	976	25.4	0.873	DONE
D7NW	CS	15-Jul-98	975	10.8	0.29	DONE
D7SE	7/25/98	25-Jul-98	1039	30.5	0.961	DONE
D7SW	CS	15-Jul-98	971	8.29	<0.6	DONE, 972 DUP
D8NE	TP	05-May-98	446	17	<0.6	DONE
D8NW						DONE
D8SE	05-Aug-98	05-Aug-98	1111	545	1.03	DONE
D8SW	CS	14-Jul-98	967	56.8	0.212	DONE, 968 DUP
D9NE	CS	15-Jul-98	973	76.3	0.54	DONE
D9NW	25-Jul-98	25-Jul-98	1036	117	0.735	DONE
E1NE	18-May-98	19-May-98	624	<5.0	<0.4	DONE
E1NW	13-May-98	13-May-98	536	3.05	<0.4	DONE
E1SE	15-Jun-98	15-Jun-98	806	9.93	<0.6	DONE
E1SW	18-May-98	18-May-98	588	10.5	0.193	DONE
E2NE	03-Jun-98	03-Jun-98	731	6.93	0.916	DONE
E2NW	28-May-98	28-May-98	654	5.28	0.863	DONE
E2SE	03-Jun-98	03-Jun-98	730	7.07	0.138	DONE
E2SW	18-May-98	18-May-98	607	9.14	1.48	DONE
E3NE	03-Jun-98	03-Jun-98	735	8.93	0.218	DONE
E3NW	15-Jun-98	15-Jun-98	804	12	3.77	CONSOL. IN CELL
E3SE	15-Jun-98	15-Jun-98	803	6.54	<0.6	DONE
E3SW	11-Jun-98	11-Jun-98	786	6.97	<0.6	DONE
E4NE	11-Jun-98	11-Jun-98	788	33.9	0.208	DONE
E4NW	11-Jun-98	11-Jun-98	787	19.3	0.253	DONE

Table A-1
SURFACE REMEDIATION
CONFIRMATION SAMPLE RESULTS

QUADRANT	DATE** EXCAVATED	DATE SAMPLED	SAMPLE SEQUENCE NUMBER	LEAD RESULT (mg/Kg)	PCBs RESULT (mg/Kg)	NOTES
E4SE	30-May-98	30-May-98	676	9.67	<0.6	DONE
E4SW	18-Jun-98	18-Jun-98	817	60.8	0.272	DONE
E5NE	27-May-98	27-May-98	648	30.2	1.43	CONSOL. IN CELL
E5NW	18-Jun-98	18-Jun-98	816	59.1	20.4	CONSOL. IN CELL
E5SE	27-May-98	27-May-98	647	50.9	0.95	DONE
E5SW	CS	13-Jul-98	964	78.7	9.24	DONE, CELL
E6NE	01-Aug-98	01-Aug-98	1076	343	5.14	DONE, UNDER COVER
E6NW	13-Aug-98	13-Aug-98	1135	64.4	2.65	DONE, UNDER WALL
E6SE	TP	06-May-98	464	11.8	<0.6	DONE
E6SW	12-Aug-98	12-Aug-98	1134	5.97	<0.6	DONE
E7NE	15-Aug-98	15-Aug-98	1141	371	>0.6	DONE
E7NW	15-Aug-98	15-Aug-98	1142	6.97	0.98	DONE
E7SE	19-Jun-98	19-Jun-98	821	73.1	0.702	DONE
E7SW	CS	01-Jun-98	679	4.47	1.26	DONE
E8NE	03-Aug-98	03-Aug-98	1109	187	0.997	DONE
E8NW	30-Jul-98	30-Jul-98	1054	29.5	<0.6	DONE
E8SE	CS	30-Jul-98	1052	32.1	<0.6	DONE
E8SW	TP	05-May-98	450	45.8	<0.6	DONE
E9NE	29-Jul-98	29-Jul-98	1050	408	1.41	DONE
E9NW	TP	05-May-98	448	1.69	<0.6	DONE
F1NE	TP		307	110	0.77	DONE
F1NW	14-May-98	14-May-98	543	15.3	0.238	DONE
F1SE	19-May-98	19-May-98	625	7.62	0.103	DONE
F1SW	14-May-98	14-May-98	544	4.52	<0.4	DONE
F2NE	06-Jun-98	06-Jun-98	756	7.07	<0.6	DONE
F2NW	TP		317	21	0.48	DONE
F2SE	CS	18-May-98	608	58	3.99	UNDER CELL COVER
F2SW	14-May-98	14-May-98	555	6.35	0.307	DONE
F3NE	29-May-98	29-May-98	658	7.56	0.312	DONE
F3NW	29-May-98	29-May-98	657	5.74	<0.6	DONE
F3SE	18-Jun-98	18-Jun-98	818	247	0.521	DONE
F3SW	15-Jun-98	15-Jun-98	802	80	4.28	DONE
F4NE	18-Jun-98	29-Jun-98	868	6.02	0.29	DONE
F4NW	20-Jun-98	20-Jun-98	831	4.61	<0.6	DONE
F4SE	12-Jun-98	29-Jun-98	869	5.11	<0.6	DONE
F4SW	TP		382	17	<0.4	DONE
F5NE	TP	06-May-98	470	87	2.59	DONE
F5NW	20-Jun-98	20-Jun-98	828	34.3	<0.6	DONE
F5SE	TP	06-May-98	467	214	8.25	DONE
F5SW	20-Jun-98	20-Jun-98	827	17.4	<0.6	DONE

**Table A-1
SURFACE REMEDIATION
CONFIRMATION SAMPLE RESULTS**

QUADRANT	DATE** EXCAVATED	DATE SAMPLED	SAMPLE SEQUENCE NUMBER	LEAD RESULT (mg/Kg)	PCBs RESULT (mg/Kg)	NOTES
F6NE	01-Aug-98	01-Aug-98	1078	15.2	0.172	DONE
F6NW	01-Aug-98	01-Aug-98	1079	49.9	2.32	DONE, UNDER COVER
F6SE	12-Aug-98	12-Aug-98	1133	10.9	<0.6	DONE
F6SW	12-Aug-98	12-Aug-98	1132	12.5	0.101	DONE
F7NE	12-Aug-98	12-Aug-98	1126	7.39	<0.6	DONE
F7NW	12-Aug-98	12-Aug-98	1125	35.7	0.31	DONE
F7SE	14-Aug-98	15-Aug-98	1143	11.5	<0.6	DONE
F7SW	14-Aug-98	15-Aug-98	1139	37.4	<0.6	DONE
G1NE	15-May-98	15-May-98	557	2.58	<0.4	DONE
G1NW	16-May-98	16-May-98	568	5.69	0.222	DONE
G1SE	19-May-98	19-May-98	626	10.3	0.361	DONE
G1SW	TP		329	23	0.353	DONE
G2NE	16-May-98	16-May-98	569	7.45	0.448	DONE
G2NW	15-May-98	15-May-98	556	13.4	0.53	DONE
G2SE	TP		323	22.5	<0.4	DONE
G2SW	18-May-98	18-May-98	587	3.97	<0.4	DONE
G3NE	13-Jun-98	13-Jun-98	796	9.73	1.31	DONE
G3NW	19-Aug-98	19-Aug-98	1144	8.62	0.338	DONE
G3SE	15-Jun-98	15-Jun-98	800	6.21	0.361	DONE
G3SW	19-Jun-98	19-Jun-98	823	5.83	1.28	UNDER CELL COVER
G4NE	19-Jun-98	19-Jun-98	826	10.5	<0.6	DONE
G4NW	TP	19-May-98	614	50.2	0.321	DONE
G4SE	TP		379	242	8.11	DONE
G4SW	TP	19-May-98	616	17	0.929	DONE
G5NE	06-Jul-98	06-Jul-98	894	17.1	<0.6	DONE
G5NW	TP	19-May-98	618	13.8	0.233	DONE
G5SE	19-Jun-98	19-Jun-98	825	10.4	0.274	DONE
G5SW	23-Jun-98	23-Jun-98	836	24.9	<0.6	DONE
G6NE	05-Aug-98	05-Aug-98	1112	18.8	<0.6	DONE
G6NW	01-Aug-98	01-Aug-98	1082	374	2.72	DONE, UNDER COVER
G6SE	28-Jul-98	28-Jul-98	1051	254	0.909	DONE
G6SW	CS	06-Jun-98	760	44	<0.6	DONE
G7NE	CS	06-Jun-98	762	59.3	0.401	DONE
G7NW	28-Jul-98	28-Jul-98	1049	8.11	<0.6	DONE
H1NE	CS	16-May-98	570	19.6	<0.4	DONE
H1NW	TP	21-Aug-98	1156	61.1	1.35	DONE
H1SE	13-Aug	13-Aug-98	1138	29	1.03	DONE
H1SW	CS	21-May-98	631	39.1	0.863	DONE
H2NE	CS	16-May-98	575	18	0.277	DONE
H2NW	TP	21-Aug-98	1155	43	0.851	DONE

**Table A-1
SURFACE REMEDIATION
CONFIRMATION SAMPLE RESULTS**

QUADRANT	DATE** EXCAVATED	DATE SAMPLED	SAMPLE SEQUENCE NUMBER	LEAD RESULT (mg/Kg)	PCBs RESULT (mg/Kg)	NOTES
H2SE	CS	16-May-98	577	9.49	0.339	DONE
H2SW	TP	21-Aug-98	1154	24.7	0.494	DONE
H3NE	30-May-98	30-May-98	675	16.2	0.394	DONE
H3NW	TP	21-Aug-98				AREA INACCESSIBLE
H3SE	21-May-98	22-May-98	634	45.2	1.21	DONE
H3SW	TP	21-Aug-98	1148/1149	21.1/25.5	0.114/<0.6	DONE
H4NE	13-Aug-98	13-Aug-98	1137	9.13	0.492	DONE
H4NW	TP	21-Aug-98	1150	32.6	<0.6	DONE
H4SE	TP	18-May-98	597	40.7	0.276	DONE
H4SW	TP	21-Aug-98	1151	25.2	<0.6	DONE
H5NE	30-May-98	30-May-98	673	9.72	<0.6	DONE
H5NW	TP	21-Aug-98	1152	16.1	<0.6	DONE
H5SE	TP	18-May-98	604	26.3	0.137	DONE
H5SW	TP	21-Aug-98	1153	39	0.317	DONE
H6NE	CS	10-Jun-98	784	9.93	<0.6	DONE
H6NW	CS	10-Jun-98	785	33.9	0.499	DONE
H6SE	CS	27-Jul-98	1047	9.52	<0.6	DONE
H6SW	CS	27-Jul-98	1045	9.65	<0.6	DONE
H7NE	CS	27-Jul-98	1043	36.5	<0.6	DONE
H7NW	CS	27-Jul-98	1041	135	0.136	DONE
H7SE	CS	6/23/98	835	101	0.729	DONE
H7SW	CS	6/23/98	834	37	0.19	DONE
I7NE	CS	29-Jun	877	34.9	0.424	DONE
I7NW	CS	29-Jun	876	32.2	0.233	DONE
I7SE	CS	29-Jun	878	11.3	<0.6	DONE
I7SW	CS	29-Jun	879	14.4	<0.6	DONE

TOTAL QUADRANTS REMEDIATED = 223

****NOTE:**

"CS" REFERS TO A CONFIRMATION SAMPLE TAKEN WITHOUT BACKHOE TEST PIT

"TP" REFERS TO A BACKHOE TEST PIT SAMPLE

**Table A-2
SMEAR ZONE BOTTOM
CONFIRMATION SAMPLE RESULTS**

SMEAR ZONE SAMPLING AREAS(1)	DATE EXCAVATED	DATE SAMPLED	SAMPLE NUMBER	SAMPLE DEPTH (2)	PCBs RESULT (3)	COMMENTS
B4/5	23-Jul-98	23-Jul-98	996	0-6"	0.075	
B4SW	23-Jul-98	23-Jul-98	980	0-6"	0.16	
B5NW	23-Jul-98	23-Jul-98	982	0-6"	0.829	
C/B4N	23-Jul-98	23-Jul-98	998	0-6"	0.135	
C4SE	23-Jul-98	23-Jul-98	984	0-6"	0.14	
C4SW	23-Jul-98	23-Jul-98	987	0-6"	0.158	
C4SW	23-Jul-98	23-Jul-98	988	0-6"	0.126	DUPLICATE OF 987
C5NE	23-Jul-98	23-Jul-98	992	0-6"	0.385	
C5NE	23-Jul-98	23-Jul-98	993	0-6"	0.444	DUPLICATE OF 992
C5NW	23-Jul-98	23-Jul-98	989	0-6"	0.152	
C5NW	23-Jul-98	23-Jul-98	990	0-6"	0.122	DUPLICATE OF 989
C5S	23-Jul-98	23-Jul-98	1000	0-6"	<0.6	
D/C4N	23-Jul-98	23-Jul-98	1008	0-6"	<0.6	
D4/5	23-Jul-98	23-Jul-98	1006	0-6"	0.066	
D4/5W	17-Jul-98	01-Aug-98	1055	0-6"	<0.6	
D4SE	23-Jul-98	23-Jul-98	1003	0-6"	1.68	
D5NE	23-Jul-98	23-Jul-98	1002	0-6"	0.0649	
D5S	23-Jul-98	23-Jul-98	1005	0-6"	0.557	
E4S	17-Jul-98	01-Aug-98	1069	0-6"	0.394	
E5NE	17-Jul-98	01-Aug-98	1061	0-6"	<0.6	
E5NW	17-Jul-98	01-Aug-98	1065	0-6"	1.29	
E5SE	17-Jul-98	01-Aug-98	1058	0-6"	<0.6	
E5SW	17-Jul-98	01-Aug-98	1064	0-6"	2.67	
F5NE	17-Jul-98	01-Aug-98	1066	0-6"	<0.6	
F5NW	17-Jul-98	01-Aug-98	1105	0-6"	<0.6	
F5SE	17-Jul-98	01-Aug-98	1093	0-6"	<0.6	
F5SW	17-Jul-98	01-Aug-98	1099	0-6"	1.8	
F6N	17-Jul-98	01-Aug-98	1096	0-6"	0.128	
G5E	17-Jul-98	01-Aug-98	1102	0-6"	<0.6	
NOTES:						
(1) Smear zone sampling areas identified on figure. Areas designed to be smaller than or equal to 40' x 40' quad. See Figure 4-1 for locations.						
(2) Depth measured from bottom of smear zone excavation downward						
(3) Remedial action level for this area is 10 mg/kg.						

**Table A-3
SMEAR ZONE SIDEWALL
CONFIRMATION SAMPLE RESULTS**

QUADRANT	SIDE	DATE SAMPLED	SAMPLE NUMBER	PCBs RESULT	COMMENTS
B4NW	C	26-Jun-98	864	0.474	
B4SW	E	26-Jun-98	863	2.36	
B5NE	S	30-Jun-98	880	<0.6	
B5NE	E	30-Jun-98	881	<0.6	
B5NW	S	26-Jun-98	859	2.06	860 DUP
C3SE	C	26-Jun-98	865	0.713	
C4NW	W	13-Jul-98	950	0.257	
C4NW	W	13-Jul-98	951	<0.6	
C5SE	S	26-Jun-98	858	0.45	
C5SE	N	13-Jul-98	956	1.62	
C5SE	N	13-Jul-98	957	0.2	
C5SW	S	26-Jun-98	856	<0.6	DUP. OF 857
C5SW	N	13-Jul-98	958	0.485	
D4SW	E	10-Jul-98	943	2.24	
D5SE	S	26-Jun-98	855	0.184	
E4NE	E	07-Jul-98	896	<0.6	
E4NE	C	8-Jul-98	916	0.177	
E4NE	C	8-Jul-98	917	0.211	DUP. OF 916
E4NE	C	8-Jul-98	918	<0.6	
E4NE	C	8-Jul-98	919	<0.6	DUP. OF 918
E4NE	C	8-Jul-98	920	<0.6	
E4NE	C	8-Jul-98	921	<0.6	DUP. OF 920
E4NE	C	8-Jul-98	922	<0.6	
E4NW	E	02-Jul-98	885	<0.6	
E4NW	C	8-Jul-98	923	<0.6	
E4NW	C	8-Jul-98	924	<0.6	
E4NW	C	8-Jul-98	925	<0.6	
E4NW	C	8-Jul-98	926	<0.6	
E4SE	C	07-Jul-98	897	<0.6	
E4SE	C	07-Jul-98	898	0.1	
E4SW	E	02-Jul-98	884	<0.6	
E6NE	C	05-Aug-98	1113	0.278	
E6NW	E	05-Aug-98	1114	2.07	
F4SE	E	02-Jul-98	886	<0.6	
F4SE	C	8-Jul-98	931	<0.6	
F4SE	C	8-Jul-98	932	<0.6	
F4SE	C	8-Jul-98	933	<0.6	

Table A-3 (Cont.)
SMEAR ZONE SIDEWALL
CONFIRMATION SAMPLE RESULTS

QUADRANT	SIDE	DATE SAMPLED	SAMPLE NUMBER	PCBs RESULT	COMMENTS
F4SE	C	8-Jul-98	934	<0.6	
F4SW	E	26-Jun-98	851	<0.6	
F6NW	C	13-Jul-98	961	0.426	
F6NW	E	1-Aug-98	1079	2.32	
F6NE	C	1-Aug-98	1078	0.172	
G5NE	E	26-Jun-98	854	0.1	
G5SE	E	26-Jun-98	853	5.45	
G5SE	C	13-Jul-98	962	0.231	
G5SE	C	13-Jul-98	963	<0.6	
G6NE	C	13-Jul-98	960	2.03, <0.6	
G6SE	C	13-Jul-98	959	<0.6	
NOTES:	(1) Samples collected from sidewall zone approximately 1 - 1.5 feet above bottom of smear zone excavation or opposite zone of heaviest oil contamination in adjacent smear zone.				
	(2) To determine the limits of PCB oil in the smear zone, a number of test pit samples were tested but not included herein since they are not on the excavation limits. Also, numerous unsampled test pits were excavated to define oil limits visually.				

APPENDIX B
DATA VALIDATION SUMMARY REPORT

APPENDIX B
DATA VALIDATION SUMMARY REPORT

Data Quality and Usability

The usability of Lead and PCB data is a statement about the quality of data and the certainty of the results. Since the end use of the data is to meet cleanup action criteria, a high degree of data usability is desired. The usability of a data set is based on laboratory precision and accuracy of the data, field precision data, and professional judgement. The usability of the data sets was judged from findings presented in data validation (DV) reports (filed with EPA under separate cover, along with copies of the original laboratory reports). The discussion presented below summarizes the findings presented in those DV reports. Confirmation testing data from the 1998 Removal Action Construction Phase of the Standard Steel Superfund Project are presented in Tables A-1, A-2, and A-3.

A total of 1,494 soil tests were performed for Lead and/or PCBs on 856 samples, as part of the Removal Action Construction. The laboratory provided 87 data packages. The quality of a data package was judged using the following criteria:

- Holding Times;
- Blank Concentrations;
- Blank Spike Recoveries;
- Surrogate Recovery (PCBs only);
- Matrix Spike/Matrix Spike Duplicate (PCBs only) Recoveries
- Matrix Spike/Matrix Spike Duplicate Relative Percent Difference (PCBs only);
- Laboratory Duplicate Relative Percent Difference; and
- Completeness.

For both PCBs and Lead, holding times, blank contamination, and blank spike recoveries were all acceptable. Completeness for all the data packages was 100 percent.

Some Lead and PCB results were qualified as estimates because accuracy or precision results were outside QC limits or the results were reported at less than the practical quantification limit (PQL). Affected sample results are flagged with a "J." In addition, bias qualifiers are applied to results where appropriate (e.g., "JH" refers to an estimated results biased high). Qualified and non-qualified results are presented in Tables A-1, A-2, and A-3.

Accuracy and precision data outside QC limits were often the result of high concentrations of Lead or PCBs in the soil samples or of matrix interference.

High native concentrations of lead and PCBs interfered with the recovery of spikes and surrogates and led to the dilution of sample digestates and extracts. Matrix interference is believed to have resulted from soil heterogeneity, oil, and/or other unknown artifacts in the soil. There was no indication of chemical interference.

A majority of surrogate recoveries were within QC limits. Generally, surrogate recoveries outside QC limits resulted from high native sample PCB concentration, leading to dilution of the extract and loss of the surrogate. Results for samples with surrogate recoveries outside QC limits were estimated and qualified with a J-flag.

In general, sample results were not qualified based on spike recoveries alone. Results for other QC data, such as blank spikes and duplicates, were also considered in evaluating the laboratory's ability to accurately determine the concentrations of Lead and PCBs in the samples.

Field and Laboratory Precision

Field duplicate sampling and analysis were performed on select soil samples collected during the Removal Action Phase of the project. Duplicate analyses were collected to measure field precision. One duplicate soil sample was collected for every 10 samples in the field. Duplicate samples were created by manually homogenizing soil in a stainless steel bowl. Duplicate samples were taken from the same bowl of homogenized soil.

Laboratory duplicates were prepared by the laboratory with every analytical batch. Some duplicate analyses were performed on both site specific samples and non-site specific samples. Laboratory duplicates were taken from the same sample jar.

Field Precision

Lead

Forty-six duplicate samples were collected from the field for Lead analysis. The relative percent difference (RPD) between duplicate analyses was used as a measure of precision. For field duplicates, the QC limit for the RPD was 35%.

RPDs ranged from 0% to 142%. The 57th percentile for the data set was approximately 35%; indicating that 43% of the RPDs exceeded the QC limit. RPDs are presented in Table B-1

Errant RPDs can probably be attributed to sample heterogeneity. It is possible that the Lead in duplicate samples was not uniformly distributed in the soil or

when the sample was homogenized; thereby, leading to out of limit RPDs. A review of other laboratory QC data associated with these duplicate samples does not suggest a problem with the laboratory's ability to recover Lead from the samples.

TABLE B-1
LEAD RPDs FOR FIELD DUPLICATE SAMPLES

Sample Id Number	Original Lead	Duplicate Lead	RPD
TP-E2-SW-421/442	3220	3280	-1.85%
TP-E1-SE-426/427	4020	6060	-40.48%
TP-D9-NW-435/436	66	92	-32.91%
TP-D8-SE-443/444	66	94	-35.00%
CS-C6-NE-489/494	13.4	13.4	0.00%
CS-C1-SE-506/507	80.9	303	-115.71%
CS-B2-NW-517/518	46.8	47.1	-0.64%
CS-F3-NW-526/527	269	97.7	93.43%
CS-E4-NE-549/550	2720	1760	42.86%
CS-B2-SE-563/564	4.48	4.80	-6.90%
CS-B2-SE-563/564	4.48	4.8	-6.90%
TP-H1-NE 571/572	9.53	9.73	-2.08%
TP-H3-NE-591/592	166	110	40.58%
TP-H5-NE-602/603	11	6.64	49.43%
TP-G5-SW-620/621	88.7	72.4	20.24%
CS-H1-SE-632/633	41.3	18.4	76.72%
CS-E4-649/650	541	550	-1.65%
CS-D1-NE-655/656	96.1	162	-51.07%
CS-E3-SE-668/669	15.1	12.6	18.05%
CS-E7-SE-677/678	1500	6100	-121.05%
CS-E7-SW-679/680	4.47	2.54	55.06%
TP-D3-SOUTH-690/691	22700	40700	-56.78%
TP-G5-NW-475/476	20.4	33.1	-47.48%
CS-CO-SW-746/747	8.23	4.89	50.91%
CS-F2-NE-756/757	7.07	5.24	29.73%
C7-D2-SW-764/765	4310	3410	23.32%
CS-C0-SW-766/767	7.7	9.85	-24.50%
CS-C3-SW-790/791	58.2	55.1	5.47%
CS-D3-SE-792/793	7.87	7.73	1.79%
CS-E4-SW-812/813	450	160	95.08%
CS-E5-NW-814/815	51.5	47.1	8.92%
CS-B6-NE-841/842	37.6	34.8	7.73%
CS-B5-NE-843/844	9.15	7.52	19.56%

**TABLE B-1
LEAD RPDS FOR FIELD DUPLICATE SAMPLES**

Sample Id Number	Original Lead	Duplicate Lead	RPD
CS-B3-SW-890/891	269	1610	-142.74%
CS-E8-NW-892/893	182	202	-10.42%
TP-E3-SE-C-912/913-1-2	5	5	0.00%
TP-E4-NE-C-916/917-0-1	20.1	5	120.32%
CS-D7-SW-971/972	8.29	6.79	19.89%
CS-H7-NW-1041/1042	135	75.4	56.65%
CS-H7-NE-1043/1044	36.5	30.6	17.59%
CS-H6-SW-1045/1046	9.65	10.3	-6.52%
CS-G6-NE-1080/1081	8.49	6.51	26.40%
CS-A2-SW-1087/1091	91.1	130	-35.19%
CS-A3-NW-1090/1092	618	550	11.64%
CS-E8-NE-1109/1110	187	72.7	88.02%
CS-E7-NW-1127/1128	108	97	10.73%

Non-detect results used at one-half the PQL

PCBs

Forty-nine duplicate samples were collected from the field for PCB analysis. The RPD for duplicate analyses was used as measure of precision. For field duplicates, the QC limit for the RPD was 50%.

RPDs ranged from 0% to 200%. The 85th percentile for the data set was 46%; indicating that 15% of the RPDs exceeded the QC limit. RPDs are presented in Table B-2.

As with Lead, errant RPDs for PCBs can probably be attributed to sample heterogeneity. It is possible that the PCBs in duplicate samples were not uniformly distributed in the soil or during homogenization; thereby, leading to unacceptable RPDs. A review of other laboratory QC data associated with these samples does not suggest a problem with the laboratory's ability to recover PCBs from the samples.

TABLE B-2
PCB RPDS FOR FIELD DUPLICATE SAMPLES

Sample Number	Original PCB (ALTA)	Duplicate PCB (ALTA)	RPDs
TP-G3-NE-367/338	0.2	0.2	0.00%
TP-G4-SE-380/381	5.7	7.9	-32.35%
TP-E2-SW-421/422	340	302	11.84%
TP-E1-SE-426/428	659	577	13.27%
TP-D9-NW-435/436	0.926	0.142	146.82%
TP-D8-SE-443/444	1.32	1.22	7.87%
TP-G5-NW-475/476	0.609	0.208	98.16%
CS-C6-NE-489/494	0.025	21.1	-199.53%
CS-C1-SE-506/507	43.1	13.6	104.06%
CS-B2-NW-517/518	48.4	58.2	-18.39%
CS-F3-NW-526/527	43.1	13.6	104.06%
CS-E4-NE-549/550	48.4	58.2	-18.39%
CS-B2-SE-563/564	6.6	7.45	-12.10%
TP-H1-NE 571/572	0.3	0.3	0.00%
TP-H3-NE-591/592	6.6	7.45	-12.10%
TP-H5-NE-602/603	0.3	0.3	0.00%
TP-G5-SW-620/621	6.48	3.52	59.20%
CS-H1-SE-632/633	1.68	1.85	-9.63%
CS-E4-649/650	4.34	19.1	-125.94%
CS-D1-NE-655/656	8.47	6.86	21.00%
CS-E3-SE-668/669	0.145	0.197	-30.41%
CS-E7-SE-677/678	5.52	6.63	-18.27%
CS-E7-SW-679/680	1.26	1.13	10.88%
TP-D4-SOUTH-713-7-8	0.3	0.3	0.00%
CS-CO-SW-746/747	40.3	26.4	41.68%
CS-F2-NE-756/757	0.3	0.3	0.00%
C7-D2-SW-764/765	477	456	4.50%
CS-C0-SW-766/767	0.3	0.3	0.00%
CS-C3-SW-790/791	1.92	1.83	4.80%
CS-D3-SE-792/793	0.3	0.3	0.00%
CS-E4-SW-812/813	0.975	1.01	-3.53%
CS-E5-NW-814/815	43.8	45.7	-4.25%
CS-B6-NE-841/842	0.3	0.3	0.00%
CS-B5-NE-843/844	0.3	0.3	0.00%
CS-B3-SW-890/891	37.5	39.4	-4.94%
CS-E8-NW-892/893	1.69	1.37	20.92%
TP-E3-SE-C-912/913-1-2	0.3	0.3	0.00%

TABLE B-2
PCB RPDS FOR FIELD DUPLICATE SAMPLES

Sample Number	Original PCB (ALTA)	Duplicate PCB (ALTA)	RPDs
CS0C5-NE-922/933	0.385	0.444	-14.23%
CS-DY-SW-971/972	0.3	0.3	0.00%
CS-C4-SW-987/988	0.158	0.126	22.54%
CS-C5-NW-989/990	0.152	0.122	21.90%
CS-H7-NW-1041/1042	0.136	0.136	0.00%
CS-H7-NE-1043/1044	0.3	0.3	0.00%
CS-H6-SW-1045/1046	0.3	0.3	0.00%
CS-G6-NE-1080/1081	8.49	6.51	26.40%
CS-A2-SW-1087/1091	1.16	1.15	0.87%
CS-A3-NW-1090/1092	11.7	12.8	-8.98%
CS-E8-NE-1109/1110	0.997	0.621	46.48%
CS-E7-NW-1127/1128	1.72	1.7	1.17%

Non detect results used at one-half the PQL

Sampling Error

In terms of field sample preparation (i.e., field homogenization), duplicate sample results are useful for assessing field sampling error. Since duplicate sample results were not normally distributed, sampling error was analyzed using the two tailed Mann-Whitney Test (0.05 level of significance). The null hypothesis for the tests stated that there was no difference between the means of the original and the duplicate sample results and that any difference between the means was purely chance.

The calculated z-values for Lead and PCBs duplicate results were less than their respective *Critical* z-values; meaning, there were no significant differences between means of laboratory duplicate results. Therefore, any sampling errors can be attributed to chance and not to systematic errors in field procedures. Results are presented in Tables B-3 and Table B-4.

Table B-3
Mann-Whitney Test Analysis of PCB Results – Sampling Error

	Field Sample	Field Duplicate
Sample Size	50	50
Mean	37.47	34.36
Null Hypothesis	Ho = 0	
z-value	0.0517	
Critical z-value	1.96	
R1 & R2	2517	2532
U1 & U2	1257	1242
Probability	0.958	

Table B-4
Mann-Whitney Test Analysis of Lead Results – Sampling Error

	Field Sample	Field Duplicate
Sample Size	47	47
Mean	2379	1852
Null Hypothesis	Ho = 0	
z-value	0.2722	
Critical z-value	1.96	
R1 & R2	2268	2196
U1 & U2	1068	1140
Probability	0.7854	

Analytical Error

Laboratory duplicate sample results are useful for assessing analytical error. Since duplicate sample results were not normally distributed, sampling error was analyzed using the two tailed Mann-Whitney Test (0.05 level of significance). The null hypothesis for the tests stated that there was no difference between the means of the original and the duplicate sample results and that any difference between the means was purely chance.

The calculated z-values for Lead and PCBs duplicate results were less than their respective *Critical* z-values; meaning, there were no significant differences between means of laboratory duplicate results. Therefore, any analytical errors

can be attributed to chance and not to systematic errors in laboratory procedures. Results are presented in Tables B-6 and Table B-7

Table B-5
Mann-Whitney Test Analysis of PCB Results – Analytical Error

	Analytical Sample	Analytical Duplicate
Sample Size	40	40
Mean	19.54	20.29
Null Hypothesis	Ho = 0	
z-value	0.0914	
Critical z-value	1.96	
R1 & R2	1629	1610
U1 & U2	790	809
Probability	0.9271	

Table B-6
Mann-Whitney Test Analysis of Lead Results – Analytical Error

	Analytical Sample	Analytical Duplicate
Sample Size	69	69
Mean	518	656
Null Hypothesis	Ho = 0	
z-value	0.0660	
Critical z-value	1.96	
R1 & R2	4780	4811
U1 & U2	2396	2365
Probability	0.9473	

CONCLUSIONS

DV findings and field and analytical precision data indicate that some sample results may be affected by sample handling and analytical error. In general, RPDs for duplicate samples were acceptable and below the project specified QC limit; however, there were exceptions. Overall precision and accuracy data indicate that Lead and PCB sample results are good estimates of their true concentrations and distribution at the Standard Steel site. Statistical analysis of field and laboratory duplicate results indicates that any sampling and analytical

error can probably be attributed to chance. Therefore based on the findings presented above, Lead and PCB results for Standard Steel Removal Action Construction Phase have a high degree of usability.

APPENDIX C
MANIFESTS AND DISPOSAL CERTIFICATES

51002910

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. A K D 9 8 0 9 7 8 7 8 7		Manifest Document No. R O L 3 9		2. Page 1 of 1		Information in the shaded areas is not required by Federal law.	
3. Generator's Name and Mailing Address Standard Steel - RD/RA PRP Group 5005 E Street Road 46 Bloomington, Indiana 47401						A. State Manifest Document Number RDL39			
4. Generator's Phone (812) 334-2620						B. State Generator's ID			
5. Transporter 1 Company Name Chemron Alaska				6. US EPA ID Number A K D 9 8 0 9 8 4 4 0 5		C. State Transporter's ID			
7. Transporter 2 Company Name MA SECURITY KLEEN MA SECURITY KLEEN				8. US EPA ID Number 8 0 9 8 4 4 0 5 C A T 0 3 3 6 4 3 4 7		D. Transporter's Phone 907-344-5036			
9. Designated Facility Name and Site Address Laidlaw Environmental Services, Inc. 3 miles East, 7 miles North of Knolls, Clive, Utah 84083						E. State Transporter's ID 253-281-2800			
10. US EPA ID Number U T D 9 1 3 0 1 7 4 8						F. Transporter's Phone 907-383-4444			
11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)						12. Containers		13. Total Quantity	
						No. Type		14. Unit Wt/Vol	
a. RQ Polychlorinated biphenyls, 9, UN2315, PGII						1.8 D.M.		9.0.0 G	
b.									
c.									
d.									
J. Additional Descriptions for Materials Listed Above						K. Handling Codes for Wastes Listed Above			
a. RQ = 1016. 11A) WASTA-98B0300 14 X 55g DM, 4 X 85g DM									
15. Special Handling Instructions and Additional Information In case of spill or accidental release, dike and contain. Do not allow to enter waterways. Contact Alaska Pollution Control, Inc. at (907) 344-5036.									
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations. If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.									
Printed/Typed Name Jeffrey D Steenhoven					Signature Jeffrey D Steenhoven				
17. Transporter 1 Acknowledgement of Receipt of Materials					Month Day Year 09/30/98				
Printed/Typed Name Les Fry					Signature Les Fry				
18. Transporter 2 Acknowledgement of Receipt of Materials					Month Day Year 11/02/98				
Printed/Typed Name Shirley Winters					Signature Shirley Winters				
19. Discrepancy Indication Space per Andy Bailey: G898-0300. 10-28-98					Month Day Year 10/28/98				
20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.					Month Day Year 11/28/98				
Printed/Typed Name Eva McCroskey					Signature Eva McCroskey				



UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)		21. Generator's US EPA ID No.	Manifest Document No. ROL 39	22. Page	Information in the shaded areas is not required by Federal law.
23. Generator's Name STANDARD STEEL				L. State Manifest Document Number	
				M. State Generator's ID	
24. Transporter <u>3</u> Company Name improvement		25. US EPA ID Number ICAT000624247		N. State Transporter's ID	
26. Transporter _____ Company Name		27. US EPA ID Number		O. Transporter's Phone 805-393-2151	
				P. State Transporter's ID	
				Q. Transporter's Phone	
28 US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)			29. Containers	30. Total Quantity	31. Unit Wt/Vol
			No.	Type	R. Waste No.
a.					
b.					
c.					
d.					
e.					
f.					
g.					
h.					
i.					
j.					
S. Handling Codes for Wastes Listed Above					
a.	b.	c.	d.	e.	f.
h.	i.	j.			g.
32. Special Handling Instructions and Additional Information					
33. Transporter <u>3</u> Acknowledgement of Receipt of Materials					
Printed/Typed Name WAYNE MARTIN			Signature Wayne Martin		Date Month Day Year 10/21/98
34. Transporter _____ Acknowledgement of Receipt of Materials					
Printed/Typed Name			Signature		Date Month Day Year
35. Discrepancy Indication Space					

ORIGINAL - RETURN TO GENERATOR

LIDLAW
ENVIRONMENTAL
SERVICES

December 18, 1998

Standard Steel - RD/RA PRP Group
5005 E Street Road 46
Bloomington, Indiana 47401

Attn: Jeffrey D. Steenhoven

RE: PPM JOB CONTROL NUMBER: 9800170
PPM SHIPPING NUMBER: 98300

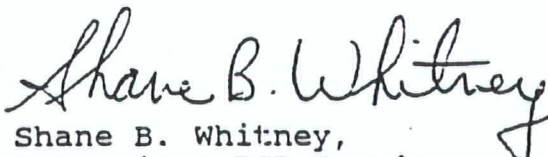
This is to inform you that the following material received from your company on manifest number ROL39, was properly incinerated as of December 12, 1998 at LAIDLAW ENVIRONMENTAL SERVICES #UTD981 552 177 located in Aragonite, Utah according to all Federal regulations contained in 40 CFR 761 and all appropriate State and Local regulations.

Description of Material

Oil From 18 Drums
Unique ID # 01 Thru 18

If you have any questions concerning the disposal of your material, please feel free to contact me in our Clive, Utah office at (801) 323-8952.

Sincerely
LAIDLAW ENVIRONMENTAL SERVICES


Shane B. Whitney,
Supervisor PCB Services

jj

CERTIFICATE OF DISPOSAL

Safety Kleen, Inc. Grassy Mountain Facility
3 mi East 7 mi North of Exit 41 off I-80
Clive, Ut 84029
EPA ID# - UTD991301748

Mailing Address:
P.O. Box 22750
Salt Lake City, UT 84122

As required by 40 CFR 761-28 (a), we are providing this certificate of Disposal to STANDARD STEEL - RD/RA DRP GROUP
to confirm that load 98006075

LINE	WS NUMBER	WASTE NAME	WT KG	TYPE	DISPOSAL CELL	DISPOSED
A	GB98-0300	EMPTY CRUSHED DRUMS	576	C	CELL Z	11-11-98

shipped on manifest number ROL39 was/were disposed in an EPA approved chemical waste landfill.

Under civil and criminal penalties of law for the making or submission of false or fraudulent statements or representations (18 U.S.C. 1001 and 15 U.S.C. 2615), I certify that the information contained in or accompanying this document is true, accurate, and complete. As to the identified section(s) of this document for which I cannot personally verify truth and accuracy, I certify as the company official having supervisory responsibility for the person who, acting under my direct instructions, made the verification that this information is true, accurate, and complete.



Acting General Manager

ALASKA POLLUTION CONTROL, INC.
P.O. Box 110374
ANCHORAGE, ALASKA 99511-0374

(907) 344-5036
(907) 746-5036

TO Wilder Construction
Attn: Accounts Payable
11301 Lang Street
Anchorage, AK 99515

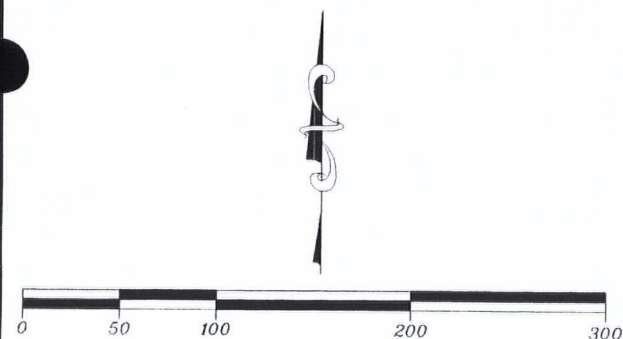
INVOICE

1974?

DATE 11/14/98	ORDER NO.
SHIP TO Site: Standard Steel RD/RA PRP Group 2400 Railroad Avenue Scott	

QUANTITY	DESCRIPTION	UNIT PRICE	TOTAL
5	(41602) Non-Regulated Soil Drums - Soil	\$300 00	\$1,500 00
3	(41702) Petroleum Contaminated Water Drums-Water	\$93 75	\$281 25
2	(41402) Facility Profile 2 @ Profile#98-2302-C Profile#98-2301-S	\$50 00	\$50 00 100 00
WE ACCEPT VISA, MASTERCARD & DISCOVER Net 30 days. Customer agrees to pay a late charge on past due balance of 1 1/2% per month and further agrees to pay reasonable attorneys fees and cost if collection is required.			1881.25 1831.25 \$1,881 25

**APPENDIX D
CONSOLIDATION CELL RECORD DRAWINGS**

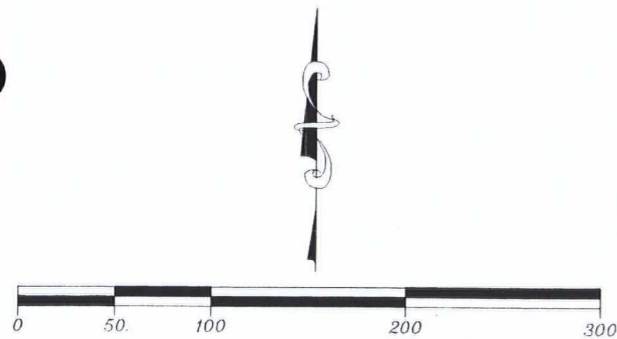


ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

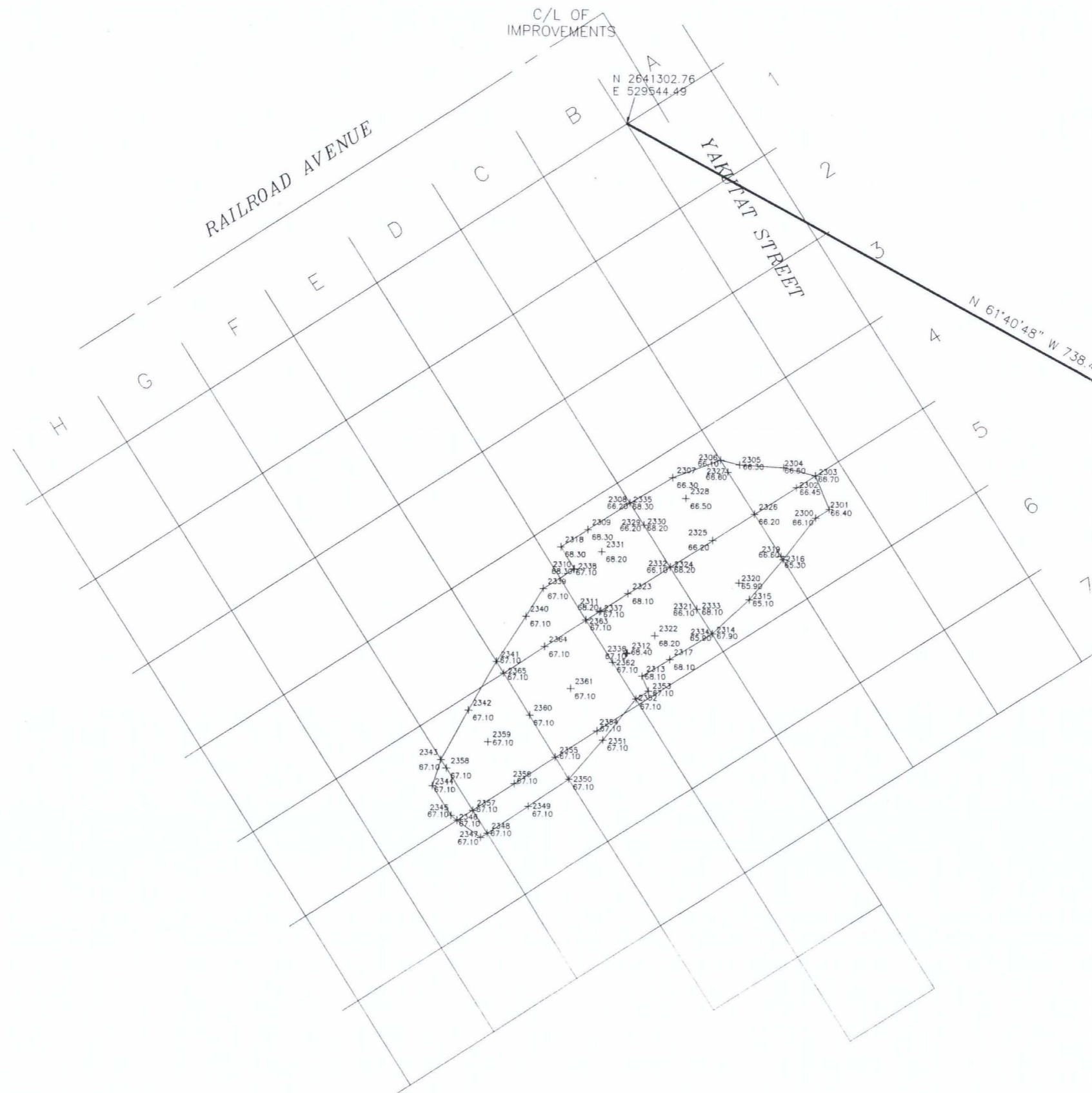
STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

ORIGINAL GROUND

SHEET
1
OF
10

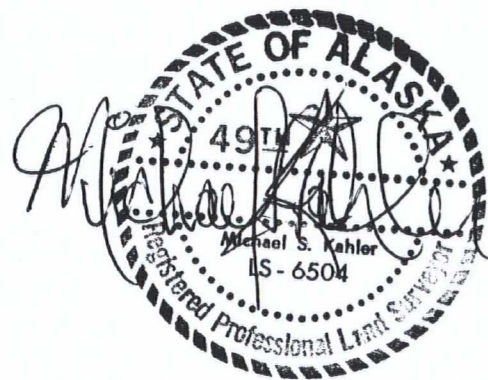


LOCATED WITHIN MUNICIPALITY
OF ANCHORAGE
STREET GRID 1134



N 2640952.44
E 530194.56
1.5" BRASS CAP
SW 1/16 CORNER
SECTION 9

CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98

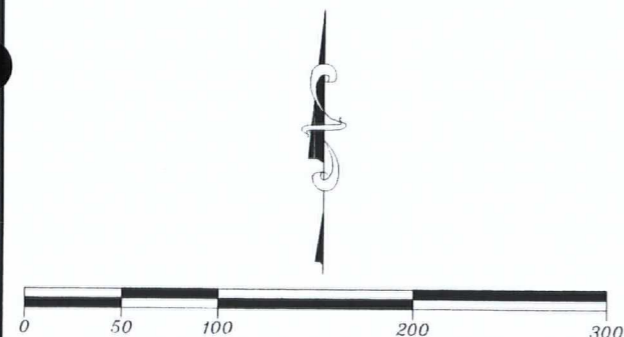


ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

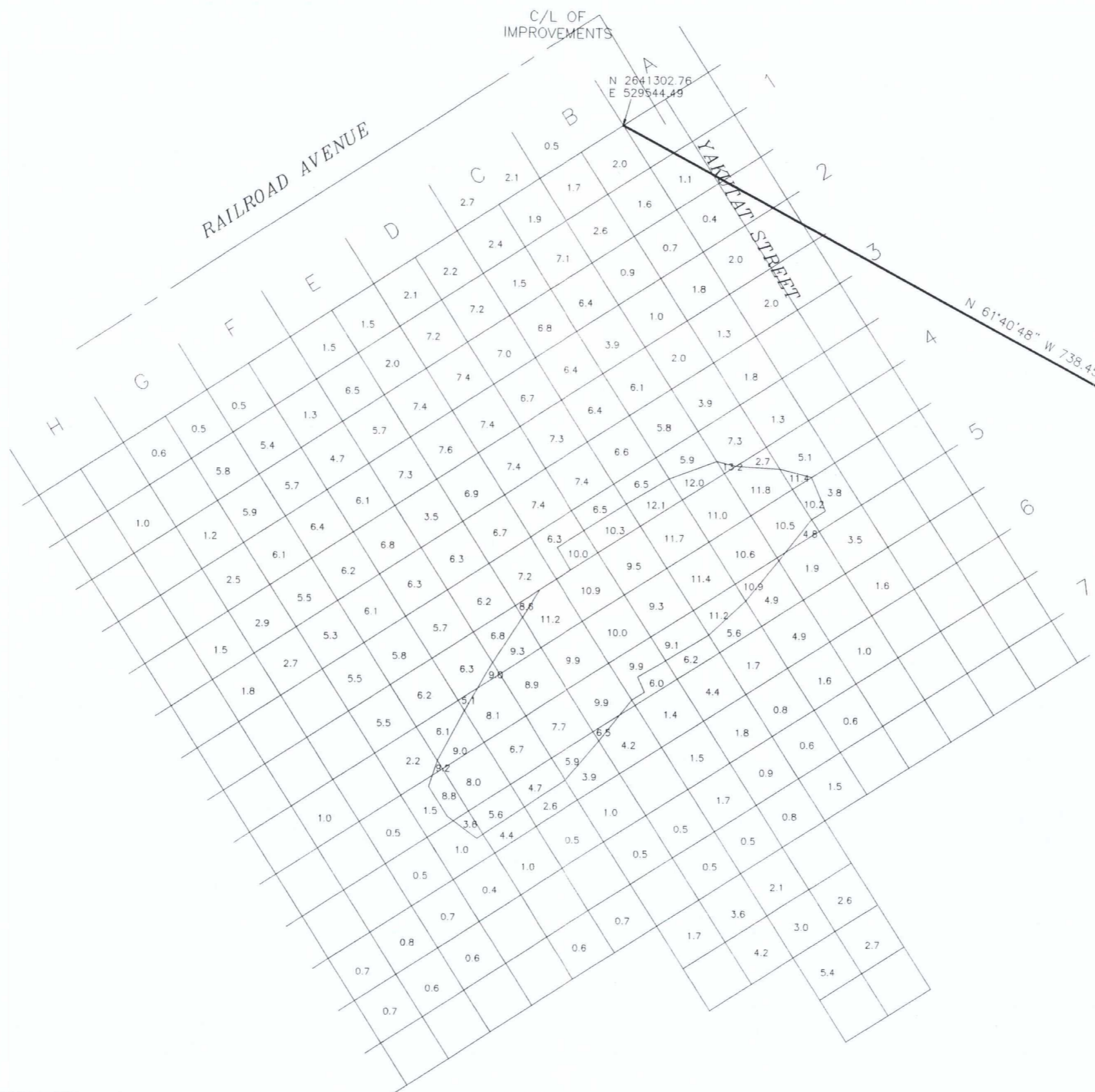
STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

SMEAR ZONE

SHEET
2
OF
10



LOCATED WITHIN MUNICIPALITY
OF ANCHORAGE
STREET GRID 1134



CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98

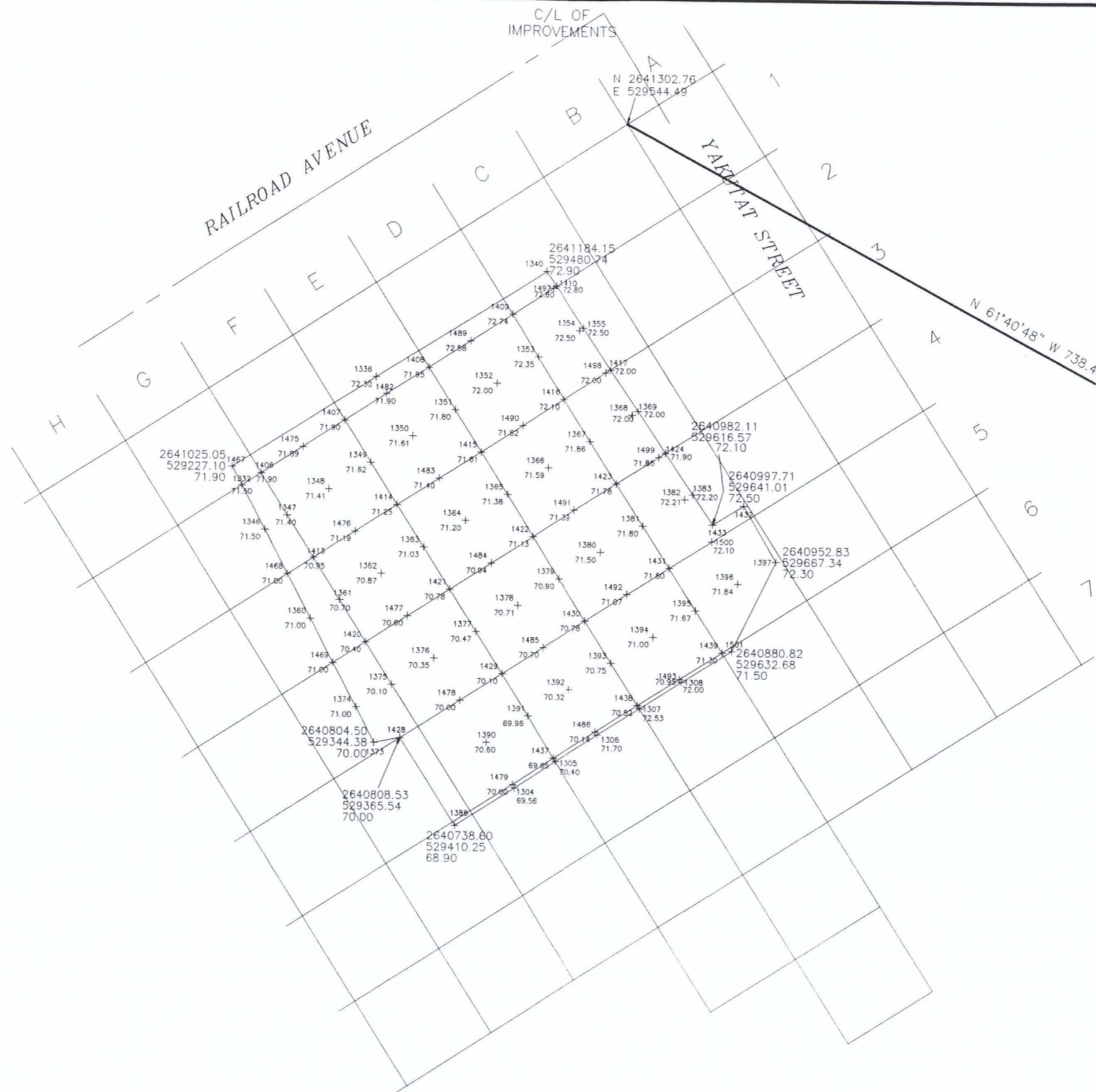
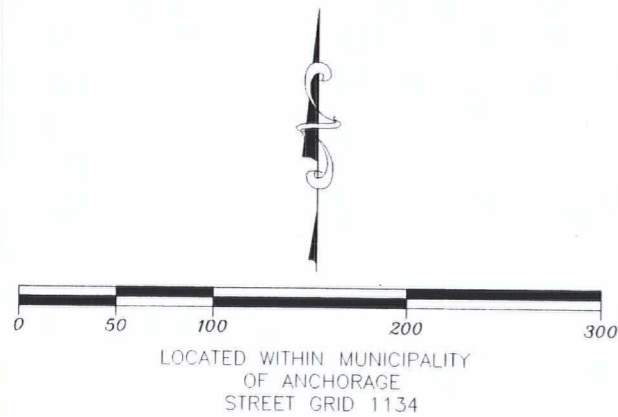


ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

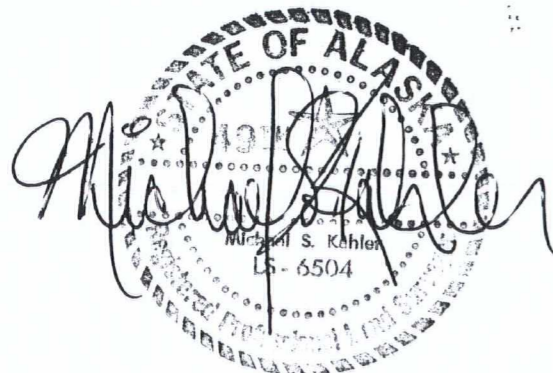
STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

DEPTH OF EXCAVATION

SHEET
3
OF
10



CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98



ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

BOTTOM OF
CONTAINMENT CELL

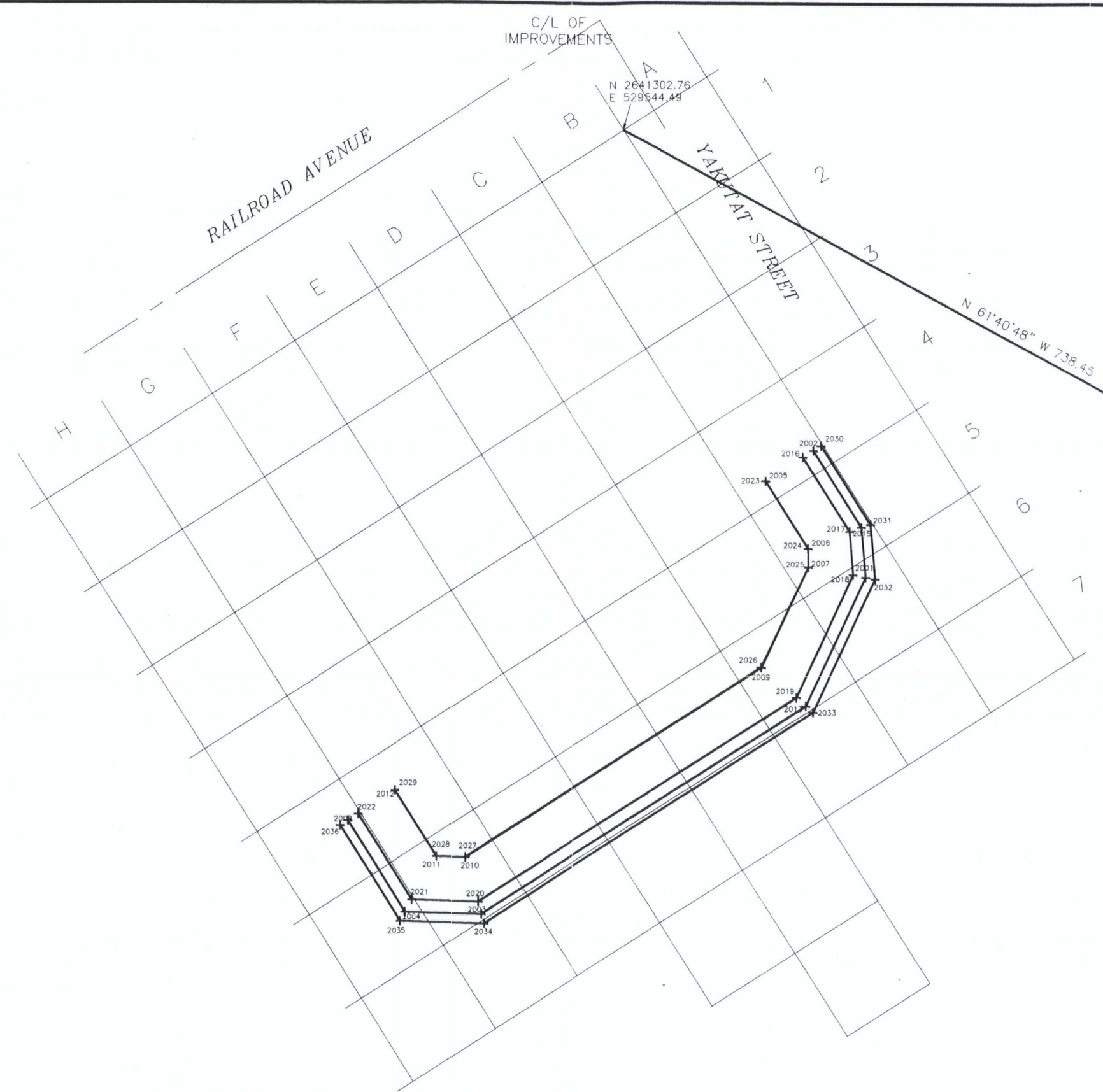
SHEET
4
OF
10



LOCATED WITHIN MUNICIPALITY
OF ANCHORAGE
STREET GRID 1134



TOP INSIDE LIMITS OF RIP RAP			
PNT	NORTH	EAST	ELEV
2023	2641017.81	529661.28	83.00
2024	2640963.06	529696.28	83.00
2025	2640947.85	529696.55	83.00
2026	2640866.52	529658.40	83.00
2027	2640711.78	529416.28	83.00
2028	2640712.34	529392.52	83.00
2029	2640765.89	529358.26	83.00
BOTTOM EXCAVATION INSIDE LIMITS OF RIP RAP			
PNT	NORTH	EAST	ELEV
2005	2641017.86	529661.37	77.90
2006	2640963.09	529696.38	77.90
2007	2640947.83	529696.65	77.90
2009	2640866.45	529658.48	77.90
2010	2640711.68	529416.31	77.90
2011	2640712.24	529392.46	77.90
2012	2640765.84	529358.18	77.90
INSIDE TOE RIP RAP EXCAVATION			
PNT	NORTH	EAST	ELEV
2016	2641037.26	529691.69	60.00
2017	2640976.93	529730.15	60.00
2018	2640941.52	529733.18	60.00
2019	2640842.08	529687.21	60.00
2020	2640675.63	529426.84	60.00
2021	2640676.90	529372.55	60.00
2022	2640746.56	529328.02	60.00



CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98

OUTSIDE TOE RIP RAP EXCAVATION			
PNT	NORTH	EAST	ELEV
2001	2640939.73	529743.37	60.00
2002	2641042.64	529700.13	60.00
2003	2640665.56	529429.66	60.00
2004	2640667.03	529367.00	60.00
2008	2640741.17	529319.59	60.00
2013	2640835.22	529695.06	60.00
2015	2640980.23	529739.91	60.00
OUTSIDE RIP RAP LIMITS			
PNT	NORTH	EAST	ELEV
2030	2641046.67	529706.45	65.00
2031	2640982.71	529747.22	65.00
2032	2640938.39	529751.01	65.00
2033	2640830.09	529700.95	65.00
2034	2640658.01	529431.77	65.00
2035	2640659.62	529362.83	65.00
2036	2640737.13	529313.27	65.00

ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

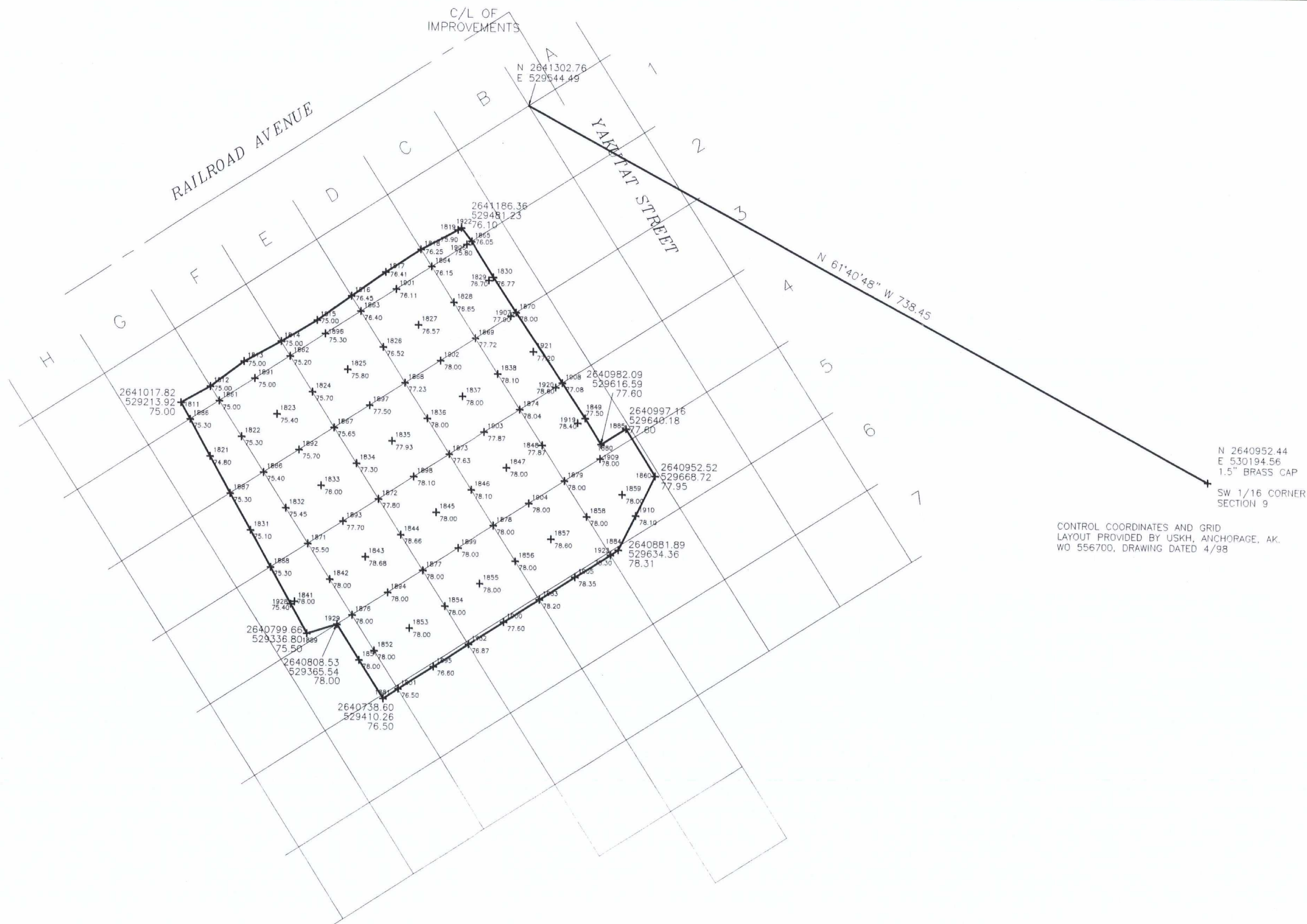
STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

LIMITS OF RIP-RAP
EXCAVATION

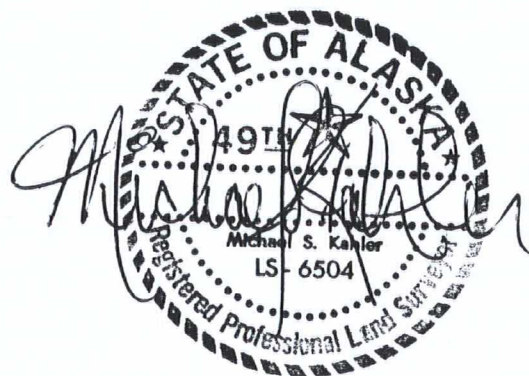
SHEET
5
OF
10



LOCATED WITHIN MUNICIPALITY
OF ANCHORAGE
STREET GRID 1134



CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98



ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

TOP OF CONSOLIDATED SOIL/
BOTTOM OF SOLIDIFIED SOIL

SHEET
6
OF
10



LOCATED WITHIN MUNICIPALITY
OF ANCHORAGE
STREET GRID 1134



CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98

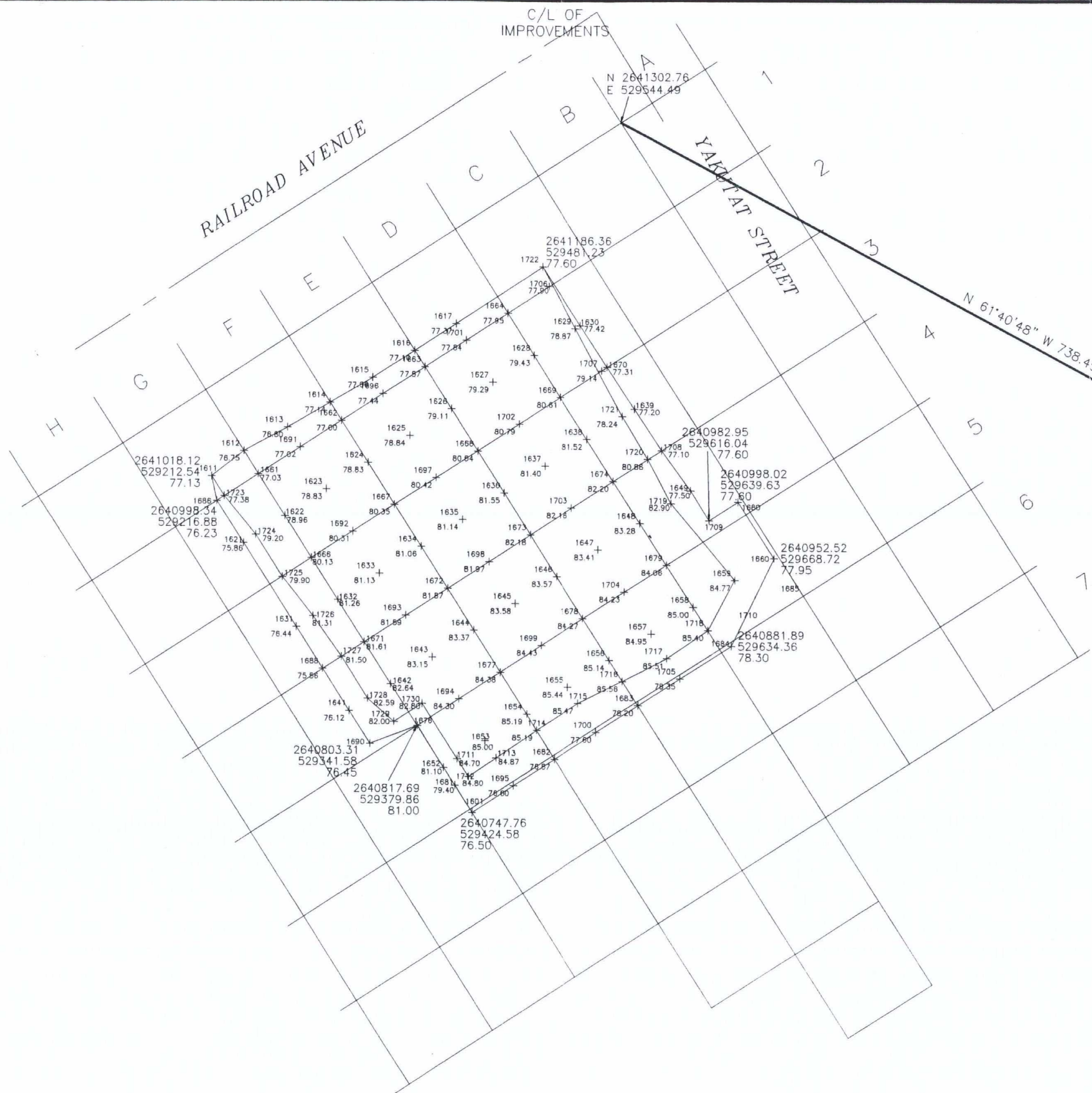
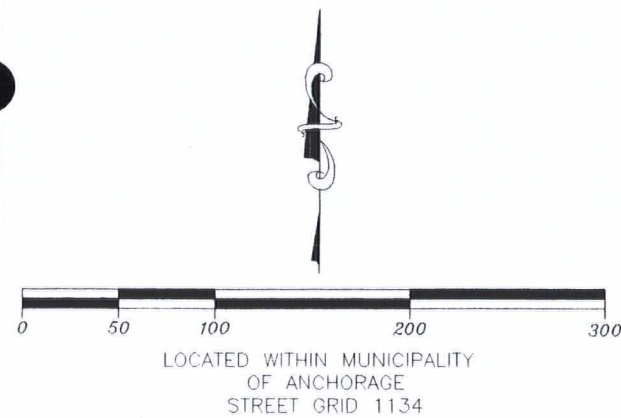
N 2640952.44
E 530194.56
1.5" BRASS CAP
SW 1/16 CORNER
SECTION 9

ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

ANCHOR TRENCH
AND
ANCHOR TRENCH PIPE

SHEET
7
OF
10



N 2640952.44
E 530194.56
1.5" BRASS CAP
SW 1/16 CORNER
SECTION 9

CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98

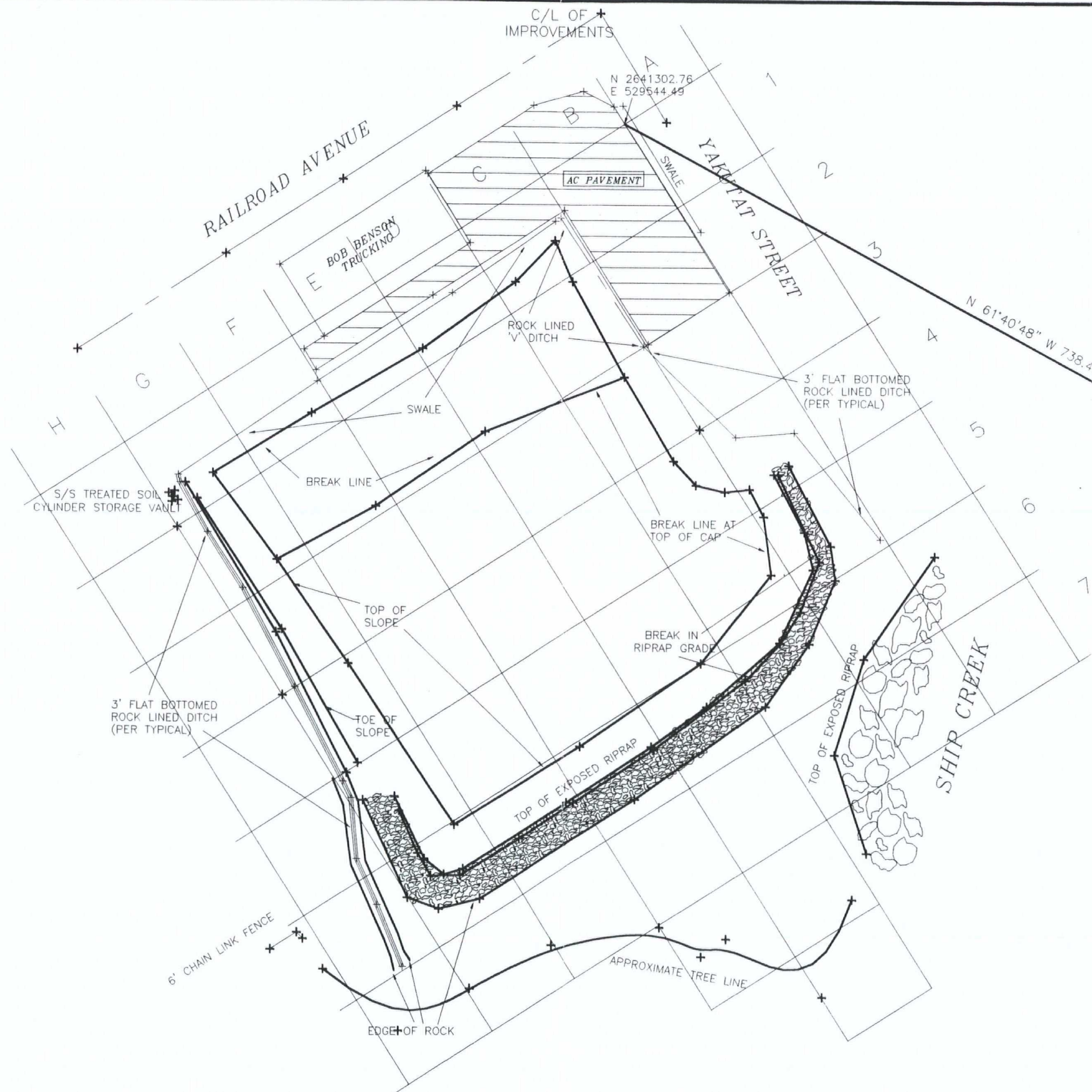
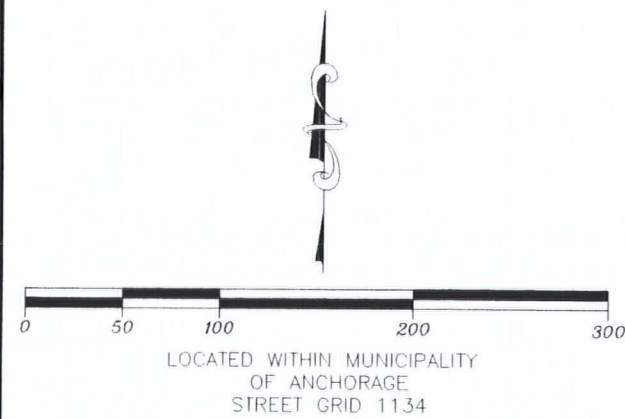


ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

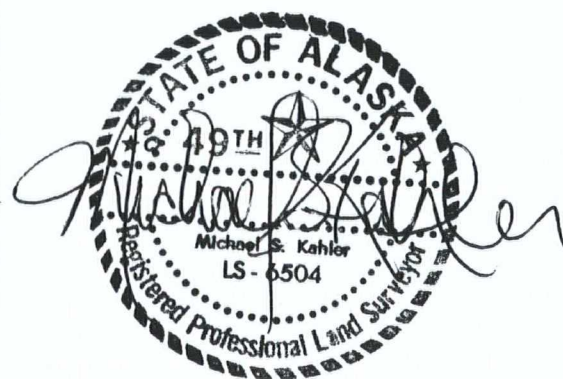
TOP SOLIDIFIED SOIL/
GEO-MEMBRANE

SHEET
8
OF
10



N 2640952.44
E 530194.56
1.5" BRASS CAP
SW 1/16 CORNER
SECTION 9

CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98

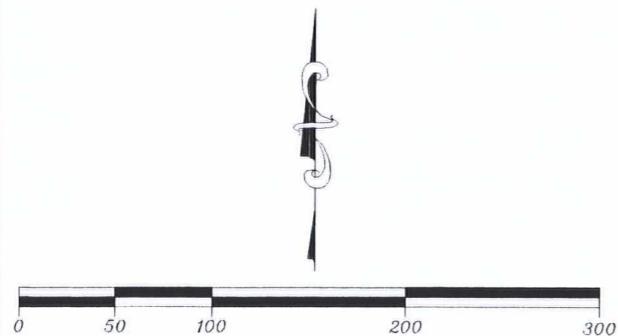


ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

POST CONSTRUCTION
ASBUILT

SHEET
9
OF
10



LOCATED WITHIN MUNICIPALITY
OF ANCHORAGE
STREET GRID 1134



N 2640952.44
E 530194.56
1.5" BRASS CAP
SW 1/16 CORNER
SECTION 9

CONTROL COORDINATES AND GRID
LAYOUT PROVIDED BY USKH, ANCHORAGE, AK.
WO 556700, DRAWING DATED 4/98



ALASKA CONSTRUCTION SURVEYS
FOR
WILDER CONSTRUCTION COMPANY

STANDARD STEEL & METALS
SALVAGE YARD
ANCHORAGE, ALASKA

POST CONSTRUCTION
DRAINAGE ASBUILT

SHEET
10
OF
10

APPENDIX E
MONITORING WELL ABANDONMENT RECORDS

No. 9108

STATE OF ALASKA

DEPARTMENT OF COMMERCE & ECONOMIC DEVELOPMENT

Division of Occupational Licensing

P.O. Box 110806, Juneau, Alaska 99811-0806

Division of Occupational Licensing

Certifies That

ALPINE DRILLING & ENTERPRISES

Is A Registered
Specialty Contractor

DRILLING CONTRACTOR
WATER SYSTEM CONTRACTOR
ROUGH CARPENTRY

Commissioner: William L. Hensley

ALASKA DEPARTMENT OF COMMERCE AND ECONOMIC DEVELOPMENT
P.O. BOX 110806, JUNEAU, AK 99811-0806

ALASKA BUSINESS LICENSE

This is to certify that the licensee named below holds an Alaska Business License covering the period January 1 through December 31 of the license year(s), or fraction thereof.

BL 81059 SIC 1700
ALPINE DRILLING & ENTERPRISES
HARPER DAVID L.
P O BOX 110456
ANCHORAGE AK 99511

EFFECTIVE 05-NOV-97

LICENSE YEARS(S)

EXPIRES 31-DEC-99

This license shall not be taken as permission to do business in the state without having complied with the other requirements of the laws of the State of Alaska or of the United States.

This license must be posted in a conspicuous place at the location.
It is not transferable or assignable.

COMMISSIONER OF COMMERCE AND
ECONOMIC DEVELOPMENT

From : ALPINE DRILL 907 345 0202

Jan. 19. 1998 10:16 PM

P02

5-21-98

Wilder Construction Co.
11301 Lang St.
Anchorage, Ak 99515

Standard Steel - Superfund Site
Anchorage, Ak.

The following monitoring wells were decommissioned on 5-4 and 5-5-98 at the above named site. Well numbers 18, 18a, 16, 17, 17a, 2, 19, 19a, 21, 21a, 7, 11, 3 and 1.

A small diameter spearpoint pipe was pressed through the bottom plate of each well. The well materials, riser pipe and screen were then pulled out of the ground leaving the small pipe in place. The wells were then pressure grouted using American Colloid high solids Bentonite grout as the pipe was pulled back to the surface. Wells were decommissioned to meet or exceed DEC requirements.

David J. Harper



Alpine Drilling & Enterprises